Aquatic Species Biological Assessment for the

DONALDSON, DEER CREEK AND INDIAN RIDGE ALLOTMENTS

BLUE MOUNTAIN RANGER DISTRICT

MALHEUR NATIONAL FOREST

GRANT COUNTY, OREGON

Prepared by:

Dan Armichardy, Assistant District Fish Biologist

Reviewed and Approved by:

Signature: _/s/ Ian Reid_______________________

Date: ___October 14, 2011______________________

for **Allen Taylor**

District Fish Biologist

TABLE 1. ESA ACTION AREA HYDROLOGIC UNIT CODE NAMES AND NUMBERS.

Donaldson Allotment			
4th Field HUC Name	**4th Field HUC Number**	**6th Field HUC Name**	**6th Field HUC Number**
North Fork John Day	17070202	Lower Fox Creek	170702020905
5th Field HUC Name	**5th Field HUC Number**	North Face Creeks	170702020904
Cottonwood Creek - NFJDR	17070202		
Deer Creek Allotment			
4th Field HUC Name	**4th Field HUC Number**	**6th Field HUC Name**	**6th Field HUC Number**
North Fork John Day	17070202	Upper Deer Creek	170702021001
5th Field HUC Name	**5th Field HUC Number**	Middle Fox Creek	170702020903
Lower North Fork John Day	1707020210	Lower Cottonwood Creek	170702020907
Cottonwood Creek	1707020209	Lower Fox Creek	170702020905
Indian Ridge Allotment			
4th Field HUC Name	**4th Field HUC Number**	**6th Field HUC Name**	**6th Field HUC Number**
North Fork John Day	17070202	Middle Fox Creek	170702020903
5th Field HUC Name	**5th Field HUC Number**	Lower Basin Creek	170702030404
Long Creek	1707020304	City Water	170702030402
Cottonwood Creek	1707020209	Upper Fox Creek	170702020901

Name and Location of Administrative Unit: Blue Mountain Ranger District, Malheur National Forest, P.O. Box 909, John Day, OR 97845

TABLE 2. ESA AND EFH EFFECT DETERMINATIONS.

Donaldson Allotment								
Common Name	**Scientific Name**	**Known to Occur?**	**Potential to Occur?**	**ESA[1] Status**	**Critical Habitat Status**	**Essential Fish Habitat Status**	**Effect Determination ESA Species/CH[2]**	**Effect Determination EFH[3]**
MCR Steelhead	*Oncorhynchus mykiss*	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
MCR Spring Chinook	*Oncorhynchus tshawytscha*	No	No	Not warranted	Not applicable	Established	Not applicable/ Not applicable	No effect
Bull Trout	*Salvelinus confluentus*	No	No	Threatened	Designated	Not applicable	No effect / No effect	Not applicable
Deer Creek Allotment								
MCR Steelhead	*Oncorhynchus mykiss*	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
MCR Spring Chinook	*Oncorhynchus tshawytscha*	No	No	Not warranted	Not applicable	Established	Not applicable/ Not applicable	No effect
Bull Trout	*Salvelinus confluentus*	No	No	Threatened	Designated	Not applicable	No effect / No effect	Not applicable
Indian Ridge Allotment								
MCR Steelhead	*Oncorhynchus mykiss*	Yes	Yes	Threatened	Designated	Not applicable	LAA/LAA[4]	Not applicable
MCR Spring Chinook	*Oncorhynchus tshawytscha*	No	No	Not warranted	Not applicable	Established	Not applicable/ Not applicable	No effect
Bull Trout	*Salvelinus confluentus*	No	No	Threatened	Designated	Not applicable	No effect / No effect	Not applicable

1. Endangered Species Act
2. Critical habitat
3. Essential Fish Habitat under the Magnuson-Stevens Fishery Conservation and Management Act
4. May Affect, Likely to Adversely Affect

TABLE OF CONTENTS

List of Tables

List of Figures

APPENDICES

1 INTRODUCTION

The Blue Mountain Ranger District of the Malheur National Forest (MNF) proposes to authorize livestock grazing for the next five seasons, 2012-16, on the Donaldson, Deer Creek and Indian Ridge Allotments . Consistent with the Endangered Species Act (ESA) and its implementing regulations, this Biological Assessment (BA) documents the analysis and conclusions of the Forest Service regarding the effects of implementing the livestock grazing it intends to authorize during this period. The analysis in the BA evaluates the effects on: (1) the Middle Columbia River Steelhead Distinct Population Segment (DPS) listed by the National Marine Fisheries Service (NMFS) as Threatened, and the Columbia River bull trout DPS listed by the US Fish and Wildlife Service (FWS) as Threatened; (2) designated critical habitat (CH) for both of these DPSs; and (3) Essential Fish Habitat (EFH) established for Chinook salmon, a species regulated under a Federal fisheries management plan. It is prepared in compliance with the requirements of Forest Service Manual (FSM) 2630.3, FSM 2672.4 ESA regulations for and regulations promulgated pursuant to the Magnuson-Stevens Fishery Conservation Act (MSA) as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267) (MSA §305(b)(2)).

1.1 CONSULTATION HISTORY

Past and ongoing informal and formal consultations that overlap the ESA action area and the 6th field HUC subwatersheds of Donaldson, Deer and Indian Ridge Allotments are described in this section.

1.1.1 INFORMAL CONSULTATIONS (PAST AND ONGOING)

1.1.1.1 BLUE MOUNTAIN EXPEDITED SECTION 7 CONSULTATION PROCESS

The MNF received a concurrence letter in June 2007 (NMFS 2007a) from NMFS (2007/02970) for a consultation on the effects of the Blue Mountain Expedited Section 7 Consultation Process (Process). The LOC is currently active, and applies through June 2012. The Process evaluates consistency of an action with a set of project design criteria (PDC). Among the categories of actions specifically considered for application of the Process are: (1) vegetation management (mechanized and non-mechanized); (2) livestock grazing (range improvements); (3) wildlife, fish or watershed improvement projects; (4) road maintenance; (5) low impact permits; and, (6) recreation and administrative sites. Other types of projects can be covered under the programmatic as long as all of the PDC are met. The Level I team will determine if the use of the expedited process is appropriate for that project.

The action agency prepares documentation evaluating whether or not the action is consistent with the PDC covered by the concurrence letter. If an action is determined to be consistent with all of the PDC after evaluation by the Level 1 team, then an ESA effect determination of “May Affect, NLAA” applies. The Level 1 team then sends a letter to the respective action agency official, documenting its finding regarding consistency with the Process and stating that the letter tiers to the concurrence letter.

Actions occurring in the Allotment that are covered by the Process:

MNF Road Maintenance

The MNF has consulted with the NMFS and USFWS on Forest wide road maintenance. On January 29, 2010 a letter was sent to the Malheur National Forrest Supervisor from the interagency members of the Malheur Level 1 Team (FS, BLM, NMFS and FWS). The letter tiered to the 2007 NMFS concurrence letter for the Process and stated that the team had reviewed the PDC documentation package for the MNF Road Maintenance program for consistency with the Process. The team agreed with the MNF finding that the project "may affect, but is not likely to adversely affect (NLAA) the species and their designated CH for Mid-Columbia River Steelhead and Bull Trout based on the rationale that was presented for consistency with all PDC in the documentation package." The Malheur Level 1 Team also concluded that the documentation package demonstrated that the action would adequately avoid, minimize or otherwise offset potential effects to designated EFH and fulfilled requirements under the MSA. The letter provided ESA and MSA coverage for the Forests Road Maintenance program from 2010 to 2015.

1.1.1.2 LIVESTOCK GRAZING

In 2007 the MNF informally consulted with NMFS on the 2007-2011 livestock grazing seasons, including the Donaldson, Deer, and Indian Ridge Allotments (NMFS reference number 2007/01239).

1.1.2 FORMAL CONSULTATION (RECENT AND ONGOING)

1.1.2.1 AQUATIC AND RIPARIAN RESTORATION PROGRAMMATIC CONSULTATION

The Forest Service and BLM concluded formal consultation on June 27, 2008 with NMFS (2008/03505) on Forest Service and BLM aquatic restoration activities for administrative units in Oregon and Washington including the MNF. The biological opinion (BO) applies through CY 2012, and provides coverage for 19 aquatic restoration program activity types:

1. Large Wood, Boulder, and Gravel Placement
2. Reconnection of Existing Side Channels and Alcoves
3. Head-cut Stabilization and Associated Fish Passage
4. Bank Restoration
5. Fish Passage Culvert and Bridge Projects
6. Irrigation Screen Installation and Replacement
7. In-channel Nutrient Enhancement
8. Floodplain Overburden Removal
9. Reduction of Recreation Impacts
10. Estuary Restoration
11. Riparian Vegetation Treatment (non-commercial, mechanical)
12. Riparian and Upland Juniper Treatment (non-commercial)
13. Riparian Vegetation Treatment (controlled burning)
14. Riparian Area Invasive Plant Treatment
15. Riparian Exclusion Fencing (with water gaps and stream crossings)
16. Riparian Vegetation Plantings

17. Road Treatments
18. Removal of Legacy Structures
19. Fisheries, Hydrology, Geomorphology Wildlife, Botany, and Cultural Surveys in Support of Aquatic Restoration

Actions occurring in the allotment area that are covered by the Aquatic and Riparian Restoration Programmatic Consultation:

Indian Ridge Allotment: Blue Mountain District Range Fence Construction 2011. This project includes construction of new fencing in the Dixie Allotment in order to effectively manage cattle distribution across the allotment and protect MCR steelhead and their designated critical habitat. The project is expected to occur in 2011 and includes design criteria specified in aquatic restoration program activity type #15.

Deer Creek Allotment: Plantation Maintenance – Long Creek Thinning Project. This project includes pre-commercial thinning and controlled burning of plantations from previously harvested units, some of which occur within the Deer Creek Allotment. The project is expected to begin in 2011 and includes design criteria specified in aquatic restoration program activity types #11 and #13.

1.1.2.2 LIVESTOCK GRAZING

On May 26, 2006, NMFS produced two biological opinions regarding the impacts of authorized grazing for the 2006 season on 16 MNF allotments. NMFS's 2006 biological opinion (NMFS reference number 2005/05693) included the Donaldson and Deer Creek Allotments. Although outside the ESA action area of the Donaldson, Deer, and Indian Ridge allotments but within three of the same subwatersheds, a formal consultation with NMFS (reference number 2007/01290) was also completed in 2007 for the Mt. Vernon and Beech Creek allotments located in the North Face Creeks 6^{th} field subwatershed, the King Allotment located in the Middle Fox Creek 6^{th} field subwatershed, and the Fox Allotment located Upper Fox Creek 6^{th} field subwatershed.

2 DESCRIPTION OF PROJECT AREA

The Donaldson Allotment is located within the North Fork John Day (HUC # 17070202) subbasin (Table 1). The two pastures comprising the Donaldson Allotment lie within the Cottonwood Creek (HUC # 17070202) watershed. The Donaldson Allotment is located at the southwest end of Fox Valley on National Forest System Lands, mostly within T. 11, and 12 S, R. 28, and 29 E. The Allotment includes approximately 8,000 acres of National Forest System (NFS) Lands with 4,000 acres being located within each pasture. The Hinton pasture does not contain MCR Steelhead critical habitat.

Overstory vegetation in the Allotment consists of Ponderosa Pine, Douglas fir, Grand Fir, Western Larch, Lodgepole Pine, Western White Pine, and Engelmann Spruce in the drainages. Dominant grass species are bluebunch wheatgrass, Idaho fescue, elk sedge, and pine grass.

Riparian overstory vegetation generally consists of a mix of hardwood and conifer species along the stream. Dominant hardwood species generally consist of Alder and Dogwood, conifer species are generally Lodgepole Pine and Grand Fir.

Throughout this allotment, livestock have varying levels of access to streams and the associated riparian communities. Parameters such as gradient, valley form, geologic substrate, vegetative structure, and forage availability can greatly influence livestock movement, use patterns, and distribution relative to streams. Other factors, such as the presence of “windthrown” or “jack-strawed” timber, may also influence livestock accessibility to streams and riparian communities.

Shade is provided by grass and grass-like species, riparian hardwood species and conifer species along the stream. Historically, riparian areas were logged by conventional tractor yarding. The combination of logging, insect epidemic, and valley bottom roads has reduced shading from conifer species. Activities that have occurred or continue to occur within these watersheds include historic mining, timber harvest, grazing, roads, trails, prescribed and natural fire, noxious weed treatment, and recreation.

The Donaldson Allotment is divided into 2 pastures: Glade and Hinton (Figure 1).

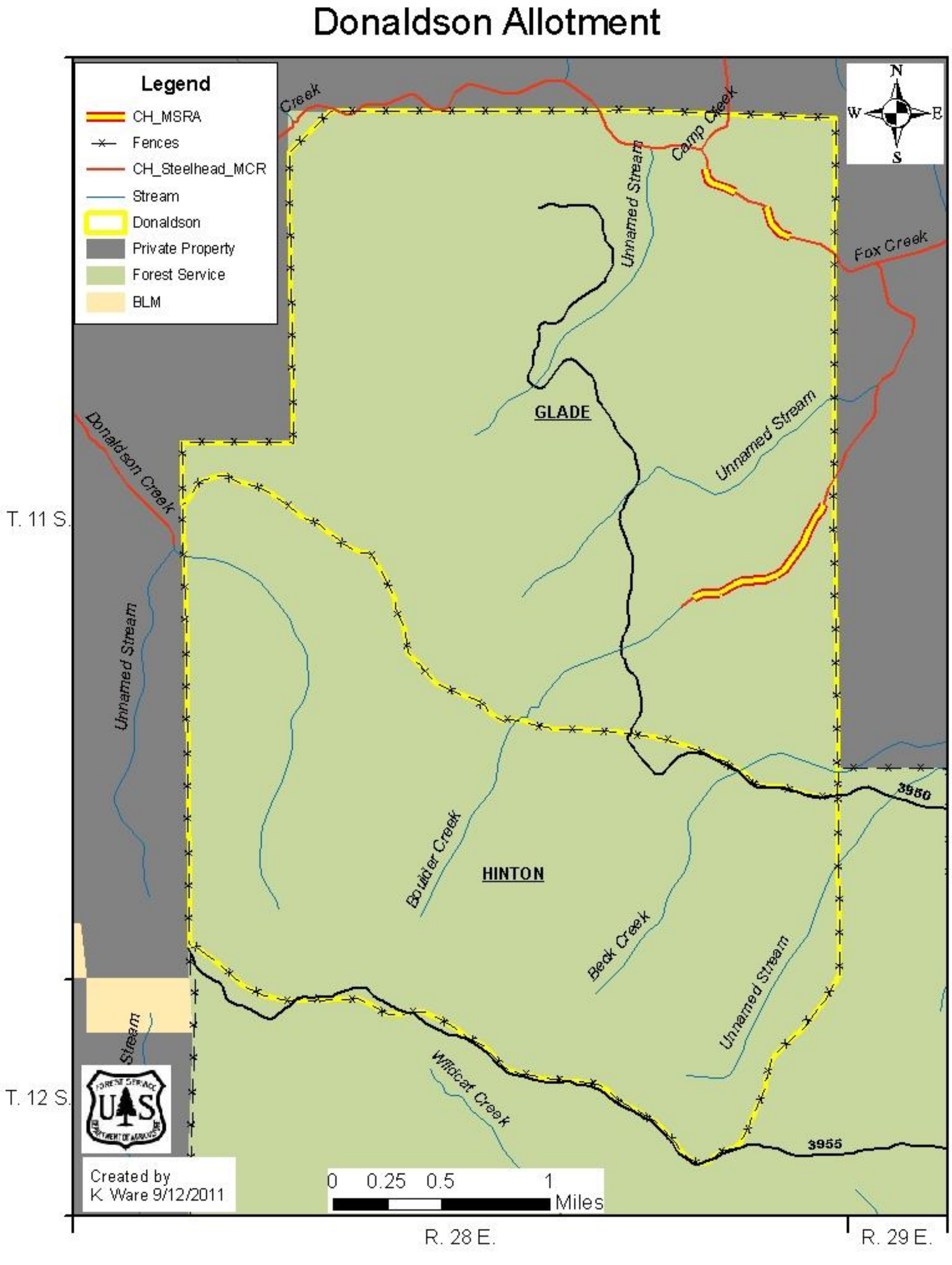

FIGURE 1. DONALDSON ALLOTMENT, PASTURES, AND MSRA MAP

The allotment contains 2.6 miles of steelhead CH and 1.15 miles of stream reaches that the Forest has identified as "Most Sensitive Riparian Areas" (MSRA) (Table 3). In general, the MSRAs are areas the MNF has identified that are the most accessible and sensitive to livestock impacts within streams containing steelhead CH: they are not land-use designations and do not have any legally independent force or effect, but instead are being referenced in this Proposed Action to facilitate the Forest Service's analysis of impacts and provide a useful basis for distinguishing among areas the agency has already determined may be the most susceptible to causing adverse impacts to the listed fish from grazing. A detailed description of MSRA is presented in Appendix G. Locations of MSRA are found in Figure 1.

Descriptions of individual pastures are presented below.

TABLE 3. MILES OF STEELHEAD CRITICAL HABITAT DONALDSON ALLOTMENT

Stream Name	Steelhead Critical Habitat (miles)	Most Sensitive Riparian Areas (miles)
Boulder Creek	1.0	0.80
Fox Creek	0.8	0.35
Camp Creek	0.2	
Cottonwood Creek	0.6	
Total	**2.6**	**1.15**

Glade Pasture

Elevations within the Glade pasture vary from 4,000 feet on Fox Creek to 5,075 feet on the west side of the pasture. The pasture contains primarily mixed conifers consisting of Ponderosa Pine/Douglas fir. The lower elevations vary from Douglas fir/Grand Fir and Ponderosa pine on NFS lands to Ponderosa Pine/Juniper dominant stands on private property. Understory vegetation consists primarily of mixed wheat grasses and bluebunch wheatgrass and Idaho fescue at the lower elevations, and elk sedge and pine grass in the more timbered, higher elevations.

Streams containing steelhead critical habitat within the Glade pasture are: Fox Creek, Camp Creek, Boulder Creek, and Cottonwood Creek. Reaches of Fox Creek are also designated

MSRA within the Glade pasture. R6 Stream surveys have been conducted on Fox Creek and Camp Creek. No stream surveys have been completed on Cottonwood Creek.

Hinton Pasture

Elevations within the Hinton pasture vary from 4,600 feet to 5,600 feet. The pasture contains primarily mixed conifers consisting on Ponderosa Pine, Douglas fir, Grand Fir and Western Larch. The lower elevations vary from Douglas fir/Grand Fir and Ponderosa pine on NFS lands to Ponderosa Pine dominate stands on private property. Understory vegetation consists primarily of mixed wheat grasses and bluebunch wheatgrass and Idaho fescue at the lower elevations, and elk sedge and pine grass in the more timbered. At the highest elevations within the pasture the timber gives way to open grasslands of Idaho fescue and sagebrush. Fish bearing streams within this pasture include Boulder Creek and a portion of Donaldson Creek which is perennial and has Steelhead critical habitat ending at the allotment boundary.

No streams within the Hinton pasture contain MCR steelhead CH.

2.1 DEER CREEK ALLOTMENT

The Deer Creek Allotment is located within the North Fork John Day (HUC # 17070202) subbasin (Table 1). The Deer Creek Allotment lies within the Lower North Fork John Day (HUC # 1707020210) and Cottonwood Creek (HUC # 1707020209) watersheds. The Deer Creek Allotment is located between the Fox and Long Creek Valleys and is surrounded by mostly private lands mostly within T 10 and 12 S, R 28 E. The Allotment encompasses approximately 2,100 acres. Private land within the allotments consists of 800 acres. Elevations within the allotment range from 4,000 feet along the West Fork Deer Creek, to 5,115 feet in the northwest corner of the allotment.

Overstory vegetation in the Allotment varies from dominant Ponderosa Pine stands with associated species of Douglas fir, Grand Fir, and Western Larch. The understory consists of bluebunch wheatgrass, pine grass/elk sedge communities and Idaho fescue. Riparian overstory vegetation generally consists of a mix of hardwood and conifer species along the stream. Dominant hardwood species generally consist of Alder; conifer species are generally Grand Fir and Douglas fir.

Throughout this allotment, livestock have varying levels of access to streams and the associated riparian communities. Parameters such as gradient, valley form, geologic substrate, vegetative structure, and forage availability can greatly influence livestock movement, use patterns, and distribution relative to streams. Other factors, such as the presence of “windthrown” or “jack-strawed” timber, may also influence livestock accessibility to streams and riparian communities.

Shade is provided by grass and grass-like species, riparian hardwood species and conifer species along the stream. Historically, riparian areas were logged by conventional tractor yarding. The combination of logging, insect epidemic, and valley bottom roads has reduced shading from conifer species. Activities that have occurred or continue to occur within these watersheds include historic mining, timber harvest, grazing, roads, trails, prescribed and natural fire, noxious weed treatment, and recreation.

The Deer Creek Allotment consists of one pasture: Deer Creek (Figure 2).

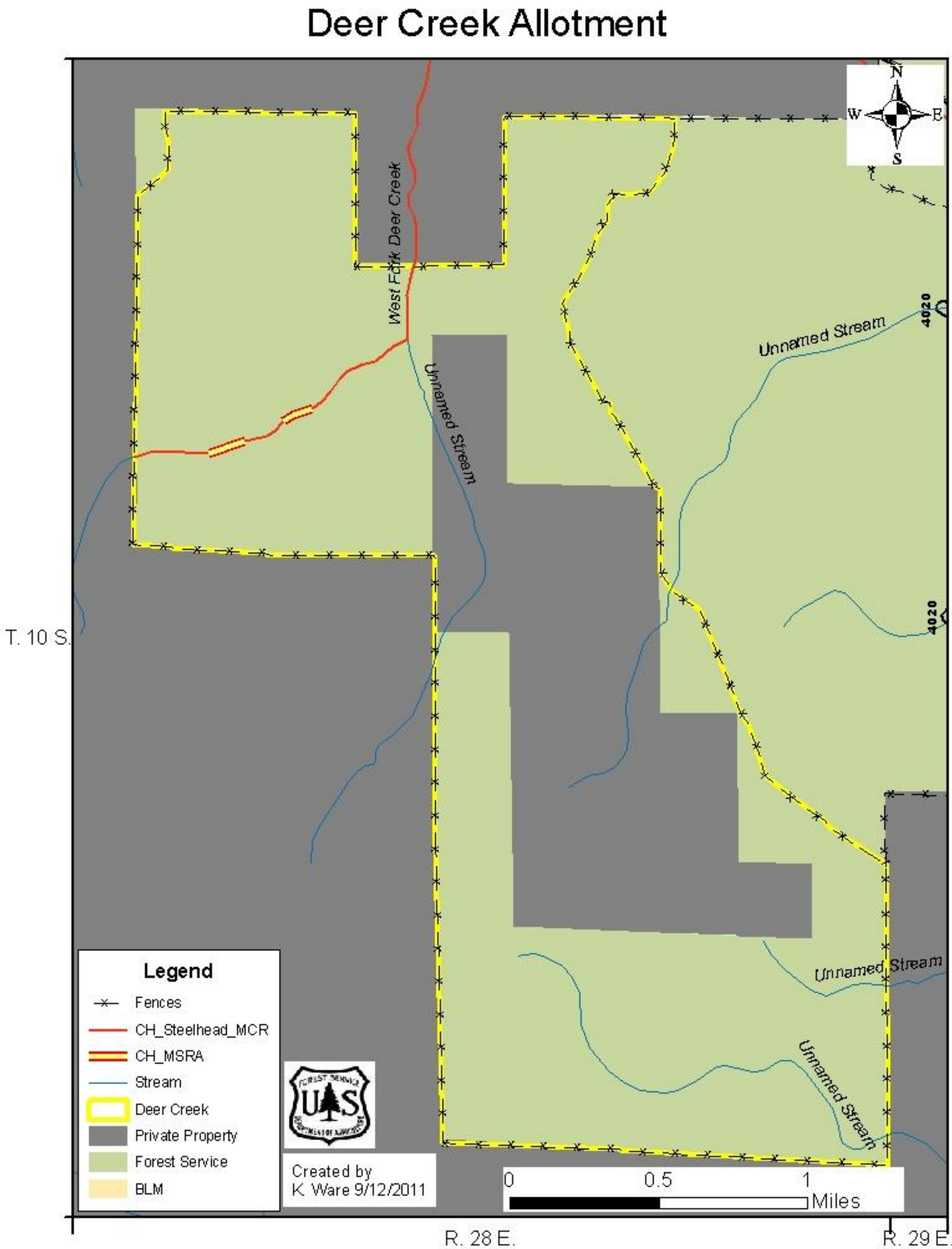

FIGURE 2. DEER CREEK ALLOTMENT, PASTURES, AND MSRA MAP

The allotment contains 1.22 miles of steelhead CH and 0.22 miles of stream reaches identified in the proposed action as MSRA (Table 4). The process for determining MSRA can be found in Appendix G. The MSRA determined by applying the process to the Deer Creek Allotment are displayed in Figure 2.

TABLE 4. MILES OF STEELHEAD CRITICAL HABITAT IN THE DEER CREEK ALLOTMENT.

Stream Name	Steelhead Critical Habitat (miles)	Most Sensitive Riparian Areas (miles)
West Fork Deer Creek	1.22	0.22
Total	**1.22**	**0.22**

2.2 INDIAN RIDGE ALLOTMENT

The Indian Ridge Allotment is located within the North Fork John Day (HUC # 17070202) subbasin (Table 1). The Indian Ridge Allotment lies within the Long Creek (HUC # 1707020304) and Cottonwood Creek (HUC # 1707020209) watersheds. The Indian Ridge Allotment is located in Fox Valley about 3 miles northwest of the town of Fox, Oregon within T 10 S, R 29 and 30 E. The Allotment encompasses approximately 4,000 acres of National Forest System Lands and has five pastures. Elevations within the allotment range from 4,500 feet to 5,000 feet in the northwest corner of the allotment.

Overstory vegetation in the Allotment varies from dominant Ponderosa Pine stands with associated species of Douglas fir, Grand Fir, and Western Larch. The understory consists of bluebunch wheatgrass, pine grass/elk sedge communities and Idaho fescue. Riparian overstory vegetation generally consists of a mix of hardwood and conifer species along the stream. Dominant hardwood species generally consist of Alder; conifer species are generally Grand Fir and Douglas fir.

Throughout this allotment, livestock have varying levels of access to streams and the associated riparian communities. Parameters such as gradient, valley form, geologic substrate, vegetative structure, and forage availability can greatly influence livestock movement, use patterns, and distribution relative to streams. Other factors, such as the presence of “windthrown” or “jack-strawed” timber, may also influence livestock accessibility to streams and riparian communities.

Shade is provided by grass and grass-like species, riparian hardwood species and conifer species along the stream. Historically, riparian areas were logged by conventional tractor yarding. . The combination of logging, insect epidemic, and valley bottom roads has reduced shading from conifer species. Activities that have occurred or continue to occur within these watersheds include historic mining, timber harvest, grazing, roads, trails, prescribed and natural fire, noxious weed treatment, and recreation.

The Indian Ridge Allotment consist of five pastures: East Indian; West Indian; West Ridge (Boothill); East Ridge; and Highway (Figure 3). Descriptions of individual pastures are presented below.

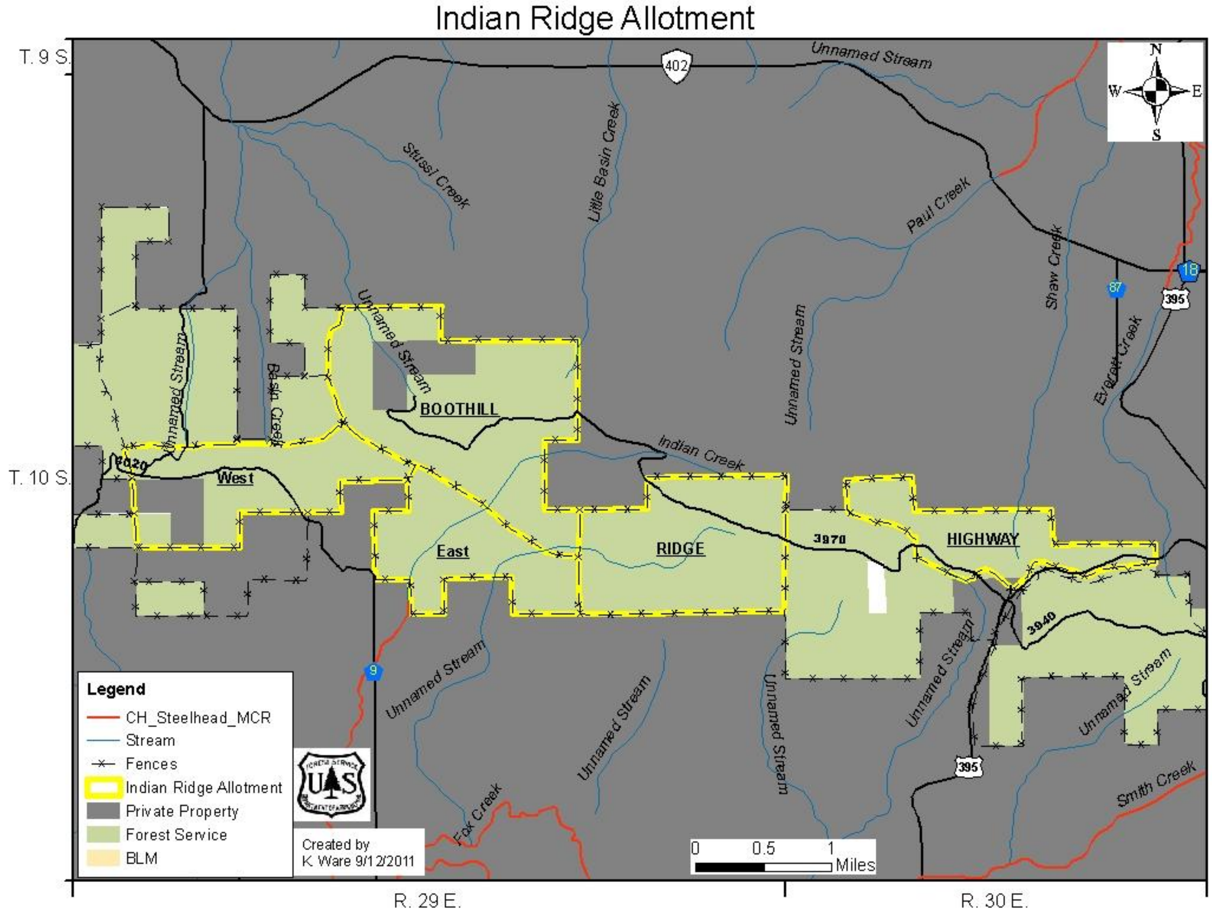

FIGURE 3. INDIAN RIDGE ALLOTMENT AND PASTURES MAP

East Pasture

Indian Creek exits this pasture from the south end and enters private. The pasture contains primarily mixed conifers Ponderosa Pine/Douglas fir. The lower elevations vary from Ponderosa pine on NFS lands to Ponderosa Pine/Juniper dominate stands on private property. Understory vegetation consists primarily of mixed wheat grasses and bluebunch wheatgrass and Idaho fescue at the lower elevations, and elk sedge and pine grass in the more timbered, higher elevations.

No streams containing steelhead CH are within the East pasture however, steelhead are known to occur within the pasture above the extent of steelhead CH habitat which ends at the pasture boundary fence, and were observed as recently as September 15, 2011, during a field assessment of Indian Creek.

West Pasture

Malheur GIS maps show only intermittent streams (tributaries to Indian Creek) in this pasture.

Boothill Pasture

Indian Creek flows through this unit. Malheur GIS maps show 0.25 miles of perennial channel and 1.5 miles of intermittent channels in this unit. This reach of Indian Creek within the West Pasture is above known fish distribution.

Ridge Pasture

The Ridge Pasture does not contain any perennial streams nor MCR steelhead CH. Malheur GIS maps shows approximately 0.5 miles of intermittent streams that flow into Fox Creek several miles downstream of the unit on private land.

Highway pasture

The Highway pasture contains a small portion of a Shaw Creek tributary. No MCR steelhead CH is found within this pasture.

3 FOREST DIRECTION AND POLICIES GUIDING DEVELOPMENT OF PROPOSED ACTION

Forest direction and policies provide a management framework that direct or guide development of grazing actions on the MNF. Components of the management framework include the MNF Land and Resource Management Plan (LRMP), pertinent LRMP amendments and Forest policies. The most pertinent amendments to the MNF LRMP are PACFISH and Amendment 29. The MNF Riparian Monitoring Strategy is a forest policy, MNF (2006).

3.1 MALHEUR NATIONAL FOREST LRMP

The MNF LRMP (MNF 1990) contains goals and objectives for the Range Program that provide direction with respect to range management and other resources. Goals 20 - 22 of the MNF LRMP for the Range program state:

"Provide a sustained production of palatable forage for grazing by livestock and dependent wildlife species."

"Manage rangelands to meet the needs of other resources and uses at a level which is responsive to site-specific objectives."

"Permit livestock use on suitable range when the permittee manage livestock using prescribed practices."

A Range program MNF LRMP Objective also provides context:

"Analyze allotments to determine proper stocking levels. Use specific management area goals and standards to resolve conflicts between wild horses, cattle and, and big game."

Rangeland will be managed to meet the needs of ESA-listed MCR Steelhead and big game as "other resources." The MNF Range program LRMP Objective directs that when there are conflicts between wild horse, cattle and big game uses in determining stocking levels, management area goals and standards will be used to resolve the conflicts.

The LRMP direction described above provides conservation benefits to ESA-listed MCR Steelhead and its designated CH by directing that the needs of other resources will be met.

Other components of the Forest management framework (MNF LRMP) that guide the development of the proposed action are discussed under the Forest amendments sections of the BA. The most pertinent amendments to the MNF LRMP are PACFISH and Amendment 29.

3.1.1 LRMP AMENDMENT 29 DESIRED FUTURE CONDITIONS

The MNF Land and Resource Management Plan (MNF 1990) was amended in 1994 (Amendment 29) in response to the Columbia River Basin Anadromous Fish Habitat Management Policy and Implementation Guide (USDA FS 1991). The Forest modified Standard 5 of the Fish and Wildlife resource elements. The amended Standard 5 included specific numerical desired future conditions (DFCs) for Management Area 3A (non-anadromous riparian areas) and Management Area 3B (anadromous riparian areas). The DFCs addressed: 1) sediment/substrate, 2) water quality, 3) stream channel morphology, and 4) riparian vegetation. See Amendment 29 for the specific numeric values (Appendix A). The numerical DFCs were selected to protect water quality, features of riparian vegetation, and components of fish habitat.

Amendment 29 did not set specific quantifiable standards for livestock grazing activities. However, grazing activities can directly affect the attainment of Amendment 29 DFCs for: 1) sediment/substrate (cobble embeddedness), 2) water quality (water temperature – Forest wide or by fish species), 3) channel morphology (large woody debris, bank stability, lower bank angle, width to depth ratios, 4) riparian vegetation (ground cover, percentage of stream bank vegetated), and 5) shade/canopy closure (hardwood/meadow complex). The MNF manages according to the more stringent standards applicable to habitat components of anadromous riparian areas as between Amendment 29 DFCs and the Riparian Management Objectives (RMOs) of the PACFISH amendment, although it should be added that the two are not always directly correlative or equally applicable; for example, with respect to bank stability, the Amendment 29 DFC applies to forested areas only. Nevertheless, this overarching directive provides conservation benefits to ESA-listed species (MCR Steelhead, CR bull trout) and its designated CH. Table 5 presents Amendment 29 DFCs and PACFISH RMOs by habitat indicator/criterion and displays which of the two is more stringent to the extent that both may be applicable in a given management situation.

The numeric values were developed for the Resource/Habitat Elements (features) of the MNF LRMP management areas 3A and 3B in amendment 29 (Appendix B). Amendment 29 states, "*These values are based upon the best information currently available and are considered to be consistent with management area desired future condition. If new information becomes available in the future which indicates changes in the numeric values to achieve the stated desired condition, these values may be inserted as a clarification/correction to the individual standard.*" Since the Forest Service adopted the Inland Native Fish Strategy (INFS) in 1995, it has been considered to contain better numeric values for bull trout water temperatures to achieve the stated desire conditions of amendment 29 (USDA FS 1995).

In general, the MNF applies the INFS RMO for water temperature to bull trout rather than standards from PACFISH or Amendment 29. INFS established a water temperature RMO that used the best available published and non-published scientific literature to define favorable water temperatures for inland native fish. The PACFISH RMO for water temperature was developed to meet the habitat needs of anadromous fish such as steelhead and chinook salmon rather than bull trout. The INFS RMO for water temperature identified maximum water temperatures below 59°F within adult holding habitat and below 48°F within spawning and rearing habitats. The

INFS RMO is more conservative for bull trout than the water temperature standards of either Amendment 29 or PACFISH (Table 5). The MNF considers the INFS water temperature standard to be the best available, favorable water temperatures for inland native fish such as bull trout.

TABLE 5. IDENTIFICATION OF MOST STRINGENT HABITAT INDICATOR NUMERIC VALUES OR CRITERIA BETWEEN AMENDMENT 29 DESIRED FUTURE CONDITIONS OR PACFISH RIPARIAN MANAGEMENT OBJECTIVES.

Habitat Indicator	Desired Future Condition or Riparian Management Objective		Most Stringent Condition or Objective
	Amendment 29	PACFISH RMO	
Cobble embeddedness	<20%	NA	Amendment 29
Water temperature	Forestwide: No increase if <68°F, reduce to 68°F if >68°F ≤ 55°F Bull Trout spawning and rearing habitat (See Appendix A for DFC details)	No measurable increase. Max below 64°F for migration/rearing, max below 60°F for spawning	MCR steelhead: PACFISH RMO CR bull trout: Amendment 29 but MNF uses INFS RMO.[1]
Large Woody Debris Stream Densities	Varies by ponderosa (20-70/mi), Mixed conifer (80-120/mi), lodgepole (100-350/mi). Sizes vary.	>20/mi >12” dia >35’ length	Amendment 29 is more specific
Pool frequency	Range expected for Rosgen B&C streams, upper limits adjusted for streams >75 ft. to be consistent w/PACFISH. Provides table w/ranges by bankfull width	Table provided shows pools/mile by wetted width. All values fall within ranges by BFW of Amendment 29	Same
Bank stability	90% and no decrease if	>80%	Amendment 29

[1] Bull trout have the coldest water temperature requirements of any native salmonid in the Pacific Northwest. The MNF considers INFS to contain better numeric values for bull trout water temperature to achieve the stated desire conditions of amendment 29.

Habitat Indicator	Desired Future Condition or Riparian Management Objective		Most Stringent Condition or Objective
(forested)	above 90%		
Lower bank angle (non-forested)	50-75% of banks w/90 degree angle or greater	>75% w/90 degree angle	PACFISH RMO
W/D ratio	<10	<10	Same
Potential LWD forest	To provide a rate of input to maintain LWD standard	NA	Amendment 29
Ground cover	90% of site potential	NA	Amendment 29
% streambank vegetated	90% of site potential	NA	Amendment 29
Shade/canopy closure	Varies by conifer species forest. Hardwood/meadow complex 80% shaded	NA	Amendment 29

3.1.2 PACFISH LRMP AMENDMENT

PACFISH applies specifically to the MNF lands within the range of anadromy including the Donaldson, Deer Creek and Indian Ridge Allotments. PACFISH amended Forest Service Land and Resource Management Plans (LRMPs). PACFISH contains the following components that provide the necessary direction and objectives, regulatory certainty that FS management actions will be designed to maintain and restore ecological processes that support high quality habitat for salmon and steelhead over the long term:

- Riparian Goals;
- Riparian Management Objectives (RMOs);
- Delineation of streamside areas (Riparian Habitat Conservation Areas) that are important to maintenance of high quality aquatic habitat and where special management considerations are applied;
- Standards and/or guidelines to ensure projects do not prevent or retard attainment of riparian goals and management objectives;
- Designation of Key watersheds where additional management emphasis and/or watershed analysis is required to ensure that salmon and steelhead habitat is maintained or provided priority for restoration;
- Watershed analyses to provide sufficient context for designing actions that support maintenance or restoration of aquatic habitats needed for recovery of ESA-listed salmon and steelhead;
- Targeted watershed restoration identified through watershed analysis;

- Monitoring program to evaluate the implementation (compliance) and effectiveness of PACFISH in improving aquatic habitat on federal lands.

Riparian Goals provide management context for proposed activities. The goals of PACFISH establish an expectation of the characteristics of healthy, functioning watershed, riparian areas, and associated fish habitats. They are stated in relatively broad, generic terms such that they can be said to apply to most riparian areas regardless of stream type and other more specific conditions, but need to be evaluated in the context of the particular stream at issue. Since the quality of water and fish habitat in aquatic systems is inseparably relate to the integrity of upland and riparian areas within watersheds, PACFISH articulates the following goals to maintain or restore:

- Water quality, to a degree that provides for a stable and productive riparian and aquatic ecosystem;
- Stream channel integrity, channel processes and sediment regime (including the elements of timing, volume, and character of sediment input and transport) under which riparian and aquatic ecosystems developed;
- Instream flows to support healthy riparian and aquatic habitats, stable and functioning channels, and the ability to route flood flows;
- Natural timing and variability of water tables in meadows and wetlands;
- Diversity and productivity of native and desirable non-native plant communities in riparian zones;
- Riparian vegetation to provide for 1) an amount and distribution of large woody debris characteristic of natural aquatic and riparian ecosystems, 2) adequate summer and winter thermal regulation within the riparian and aquatic zone, and 3) rates of surface erosion, bank erosion, and channel migration characteristics of those under which the communities developed;
- Riparian and aquatic habitats necessary to foster unique genetic fish stock that evolved within the specific geo-climatic region; and,
- Habitat to support populations of well-distributed native and non-native plant, vertebrate and invertebrate populations that contribute to the viability of riparian-dependent communities.

3.1.2.1 PACFISH RIPARIAN MANAGEMENT OBJECTIVES

Interim quantitative Riparian Management Objectives (RMOs) for stream channel, riparian and watershed conditions were also developed as part of PACFISH to provide criteria against which attainment or progress of the strategy's riparian goals may be measured. The objectives need to be evaluated and assessed temporally to reflect the ecological capabilities of specific ecosystems and the fact that attainment of or progress toward many of the objectives is only able to occur over extended periods of time. In general, and to the extent applicable and feasible, the MNF manages livestock grazing so as not to prevent or retard attainment of these RMOs unless Forest Plan amendment # 29 is more stringent, which will benefit habitat for MCR Steelhead.

Bank Stability: at least 80%

Water Temperature: No measureable increase in maximum temperature; Meet state water quality standards. The standard is defined as: All streams identified as having anadromous fish passage and salmonid rearing use for Designated Beneficial Use purposes. 7 Day Mean Max

64°F (17.8°C) (migration and rearing habitat); 7 Day Mean Max 60°F (15.6°C) (spawning habitat).

Width-to-Depth Ratio (W:D): W:D <10, mean wetted width divided by mean depth (NMFS PACFISH BO 1998); or **Bankfull Width-to-Depth Ratio** within 75th percentile of the range for minimally managed or reference watershed conditions (i.e. healthy streams) by stream type (analysis pending from PACFISH/INFISH biological opinions (PIBO) Effectiveness Monitoring Team).

3.1.2.2 PACFISH RIPARIAN HABITAT CONSERVATION AREAS AND STANDARDS

Project and site-specific standards apply to all Riparian Habitat Conservation Areas (RHCAs) and to projects and activities in areas outside RHCAs that would degrade them. Standards and/or guidelines were developed to ensure to the extent practicable given site conditions that projects do not prevent or retard attainment of or reasonable progress toward riparian goals and management objectives. PACFISH (USDA FS and USDI BLM 1995) standards for livestock management are presented below.

- GM-1 - Modify grazing practices (e.g., accessibility of riparian area to livestock, length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of Riparian Management Objectives or are likely to adversely affect listed anadromous fish. Suspend grazing if adjusting practices is not effective in meeting Riparian Management Objectives and avoiding adverse effects on listed anadromous fish (PACFISH).
- GM-2 – Locate new livestock handling and/or management facilities outside of Riparian Habitat Conservation Areas. For existing livestock handling facilities inside the Riparian Habitat Conservation Areas, assure that facilities do not prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish. Relocate or close facilities where these objectives cannot be met.
- GM-3 – Limit livestock trailing, bedding, watering, salting, loading, and other handling efforts to those areas and times that will not retard or prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish.

Implementing these standards clearly provide a conservation benefit to MCR Steelhead and designated CH.

3.1.2.3 PACFISH MONITORING

The PACFISH Monitoring Strategy was designed to feed information back to management for decision making. The implementation strategy uses “endpoints” and “triggers” to assess whether the authorized grazing is having the anticipated effects to resources and as an additional precautionary measure that helps the Forest Service to ensure that PACFISH direction is met as the season progresses. The endpoints measure annual conditions after grazing has been completed and the triggers measure conditions during grazing to determine if adjustments are necessary or appropriate to be made to the rotation and schedule the Forest Service has developed based on its best professional judgment and projections for a particular grazing season. The results of implementation monitoring are to be fed into effectiveness monitoring, which uses “trend” of long-term indicators of habitat condition to assess the need for revising management. This monitoring has a direct application to habitat features essential to long-term conservation of salmon and steelhead.

The PIBO Effectiveness Monitoring (EM) Program (under the Interagency Deputy Team) was initiated to evaluate the effects of land management activities on aquatic and riparian communities at multiple scales and to determine whether PACFISH management practices are effective in maintaining or improving the structure and function of riparian and aquatic conditions. A pilot study was begun in 1998 on Forest Service lands within the Salmon River basin of central Idaho. In 2000, the pilot study was expanded to include additional Federal Lands in the interior Columbia River basin. The study area includes 20 National Forests and nine BLM field units within the interior Columbia River basin. Results from sample size analysis suggested that the monitoring program will be able to detect changes in resource condition at the scale of individual Forests and BLM field offices (35 to 90 sites) for many of the attributes measured. The PACFISH Effectiveness Monitoring Program sampling design anticipates collecting information at least through 2015.

The PIBO EM and Implementation Monitoring (IM) programs are coordinated such that data collected to assess trend is linked to management actions taken under the PACFISH strategy. Thus, monitoring sites selected for evaluating the effectiveness of PACFISH are also monitored for compliance with the standards and guidelines. Preliminary results from broad-scale aquatic habitat status and trend monitoring of FS and BLM lands within the interior Columbia River basin since 2001 indicates conditions have improved over the past 5 years, continuing the habitat recovery the agencies intended to commence upon the adoption their adoption in 1995 of the protections in PACFISH (2009 MCR steelhead recovery plan).

3.1.2.4 PACFISH ENCLOSURE B: LIVESTOCK GRAZING GUIDELINES

A revision of PACFISH Enclosure B, the “Recommended Livestock Grazing Guidelines,” was sent to the PACFISH Forest Supervisors on August 14, 1995 (Appendix B). The guidelines were recommended for use in modifying applicable allotment management plans, annual operating plans, project decision documents and instructions to permittees to provide a high degree of assurance that objectives for conservation and restoration of anadromous fish habitat would be met.

The revision identified a set of key assumptions. One of the assumptions is that the goals or desired outcomes of management efforts provide the foundation for the recommended programmatic livestock grazing guidelines. The PACFISH EA was described as providing suitable riparian goals. All management activities should be structured so as not to prevent or meaningfully hinder accomplishment of the goals.

A summary of key priorities identified in the Enclosure B revision are:

- Maintain or allow for improvement of conditions where criteria for late- seral ecological status are met or exceeded.
- Adjust management practices where the criteria for mid-seral ecological status are met but the trend is static or downward. This is especially important where vegetative factors are primarily responsible for the mid-seral rating.

- Adjust management practices where the criteria for early seral ecological status are met, with the understanding that deteriorated stream bank and channel conditions may not be recovered in the near term.

The Enclosure B revision stated that Al Winward, in Clary and Webster (1989) defined ecological status as a measure of the degree of similarity between current vegetation and potential vegetation for a given riparian area. Refined definitions for the three ecological classes were presented:

- Early seral. Percent similarity of riparian vegetation to the potential natural community/composition less than or equal to 25%; or, stream bank/channel condition rating "poor".
- Mid-seral. Percent similarity of riparian vegetation to the potential natural community/composition 26-50% or better; and, stream bank/channel condition of at least "fair".
- Late seral. Percent similarity of riparian vegetation to the potential natural community/composition greater than or equal to 50% or better; and, stream bank/channel condition rating "good" or better.

The MNF is utilizing Winward (2000) to evaluate ecological status of riparian vegetation, in place of the process described in Enclosure B. If similarity of riparian information is lacking, the Enclosure B revision suggested using PFC condition classes as a substitute.

3.2 MALHEUR NATIONAL FOREST RIPARIAN MONITORING STRATEGY

Many accepted methodologies and analytical tools are available to monitor short-term and long-term rangeland and forest health. The methods and tools chosen are dependent on the specific monitoring objectives as well as constraints such as timing, available funding and personnel, other priorities, and the geographical area to be monitored. Described below are the overall monitoring strategy, methods and analytical tools that the Malheur National Forest is currently using for determining condition and trend of riparian ecosystems as they relate to grazing activities. **The assessments and monitoring methods used are intended to be an important part of the adaptive management process and are subject to changes or modifications based on new scientific findings and improvements in methodologies as well as changes in definitions and policy.** In particular, see Appendix L for a discussion of the monitoring protocol the Forest Service intends to use to evaluate compliance with bank alteration thresholds. Moreover, risk analyses and prioritization generally should be completed in all areas prior to initiating monitoring in order to determine the level and intensity of quantitative data collection. PFC assessments can serve as the risk analyses/prioritization step.

Below are the key components of the MNF Riparian Monitoring Strategy:

1. Information Gathering and Interpretation
    - Proper Functioning Condition (PFC) Assessment –qualitative condition assessment over a stream reach (geomorphic or unit specific)
    - Multiple Indicator Monitoring (MIM) – quantitative monitoring protocol at designated DMAs

- Analysis – interpretation and evaluation of assessment and monitoring information to determine current riparian condition and, to the extent feasible, trend
- Channel cross-section, streambed particle size distribution, and reach description measurements (i.e. Rosgen Channel Type)
- Forest Service Region 6 Level II Stream Inventory Surveys – extensive quantitative assessment of stream channel, riparian vegetation, aquatic habitat condition, and biota to determine condition of selected stream systems
- Spawning Surveys – quantitative assessment of redd vulnerability to disturbance

2. Support determinations of plan compliance-Provide information on which MNF can compliance with Forest Plan, including PACFISH & INFISH amendments. See Appendix C. for further discussion of Forest Plan standards and objectives related to riparian areas, water quality and fish habitat.
    - Standards are GM 1-4 in PACFISH & INFISH; standards 15-21 in Forest Plan (see Chapter IV).
    - Management Objectives for stream and riparian areas are described in PACFISH & INFISH amendments (RMO's) and in Amendment 29 of Forest Plan for MA3A/B (DFC's).
3. Recommendations
    - Shows linkage between condition, trend, and past/current management activities
        - A process that provides support for grazing management decisions or any necessary or appropriate adaptive management adjustments
            - Allows annual adjustment of management strategies, as needed, to achieve compliance with plan direction

Proper Functioning Condition Assessments

Proper functioning condition (PFC) assessments are a qualitative method for determining the condition of riparian areas. The term PFC is used to describe both the assessment process, and a defined, on the-ground condition of a riparian area. PFC assessments can be an appropriate starting point for determining and prioritizing the type and location of quantitative inventory or monitoring necessities, and has been proven to be an excellent communication tool for bringing a wide diversity of publics to agreement. All PFC assessments are to be conducted with a journey level interdisciplinary team. One purpose of these assessments is to help correlate the findings with the trend towards attainment of the Malheur Forest Plan Riparian Management Objectives (RMOs), more specifically, to determine whether grazing practices are retarding attainment of Near Natural Rates of Recovery of RMOs.

Multiple Indicator Monitoring

The July 1, 2003 PACFISH/INFISH Implementation Monitoring Program Manual provides the background and direction for monitoring. The Multiple Indicator Monitoring (MIM) supplement by Cowley/Burton, dated May 2005, provides the procedures in use by the MNF to monitor stream banks and riparian vegetation. The Interagency Implementation Team created the above documents; see Appendix E for these documents. The authors of MIM recently issued a 2011 technical guide as well (Burton et. al. 2011). MIM for grazing activities is designed to determine whether or not livestock grazing management is resulting in "Near Natural Rates of Recovery" as defined by PACFISH/INFISH. Below are the three components, which comprise MIM.

Monitoring is to be conducted by an interdisciplinary professional team trained in riparian plant identification and channel classification. Multiple indicator monitoring consists of implementation (endpoint indicator) monitoring and effectiveness (riparian objective) monitoring at designated locations (i.e. designated monitoring areas).

Designated Monitoring Areas

Designated Monitoring Areas (DMA's) are the locations in riparian areas and along streambanks where quantitative monitoring takes place. They are monitored to provide information concerning the management of critical areas. Essentially DMA selection relies on the theory that if proper management occurs in that location, proper management will be occurring throughout the rest of the management unit. See Appendix E for the procedures used to collaboratively establish DMA's. The goal is to establish more DMA's each grazing season in order to establish a 5-year re-monitoring schedule and have coverage across the Forest's allotments.

Implementation Monitoring - Endpoint Indicators

Implementation (endpoint indicator) monitoring measures indicators to determine if the authorized livestock grazing strategy for a particular season has had the projected effects to resources that the MNF has anticipated in developing the strategy and to determine if adaptive management adjustments need to be made for the following season(s). It provides information to assist with making decisions under adaptive management. Presently, implementation monitoring includes: modified extensive browse utilization (Interagency Technical References, 1996), modified stubble height (Interagency Technical Reference, 1996 and Challis Resource Area, 1999), and streambank alteration (Cowley, 2004). These procedures provide information to refine and make annual adjustments to livestock grazing management practices necessary to meet long-term management objectives (adaptive management). They can be used as early warning indicators that current grazing impacts may prevent the achievement of management objectives and can also be used to help explain changes in riparian vegetation and channel conditions over time. See web-site (*http://www.rmsmim.com/*) for sampling procedures used.

Effectiveness Monitoring - Riparian Objectives

Effectiveness (riparian objective) monitoring is designed to address the question of whether or not management practices currently applied to the area are achieving the desired results. These procedures are designed to assess the current condition and measure changes in streambanks, channels, and streamside vegetation over time, i.e., trend. They help determine if local livestock grazing management strategies and other land management actions are making progress toward achieving the long-term goals and objectives for streamside riparian vegetation and aquatic resources. The goal is to conduct effectiveness monitoring every three to five years on riparian areas and streambanks. This period of time is considered to be the minimum necessary to detect changes, although unusually wet years and/or flood events may result in short-term changes that validate the need to monitor more frequently, or at least at the time of the event. Budget and personnel constraints may limit the extent in which monitoring of this type will be conducted. Presently, effectiveness monitoring includes: modified greenline composition (adapted from Winward 2000 and USDI BLM 1996a), woody species height class (Kershner et al. 2004), streambank stability and cover (adapted from Kershner et al. 2004), woody species age class (adapted from Winward 2000), greenline-to-greenline width (Burton et al. 2008), substrate (Bunte and Apt 2001), and residual pool depth and pool frequency (Lisle 1987). These provide data and information concerning the present conditions and trend of riparian vegetation, channels, and streambanks, and to help determine if aquatic systems are being degraded, maintained, or restored across the Malheur National Forest. See web-site (http://www.fs.fed.us/biology/fishecology/emp/) for PIBO data and sampling procedures used.

Forest Service Region 6 Level II Stream Inventory Surveys

Forest Service Region 6 Level II Stream Inventory Surveys generate comparable baseline information on conditions of fish-bearing streams to support a variety of management activities. As inventories are completed and repeated over time, the information generated by them can be useful in measuring changes in stream channel conditions and determining attainment of habitat management objectives. The Level II inventory generates quantitative measurements and estimates of channel conditions and habitat attributes, including core attributes of streamflow, temperature, substrate composition, width/depth ratio, channel length and sinuosity, gradient, pool frequency, large wood, bank stability, and special habitats. Numerous non-core optional attributes may also be evaluated based on Forest needs, such as stream shading and overstory/understory vegetation. The Forest goal is to inventory 10 percent of fish-bearing streams per year, inferring a 10-year re-inventory recurrence interval. The 2010 Region 6 Stream Inventory Handbook can be found at: (http://www.fs.fed.us/r6/water/fhr/sida/handbook/Stream-Inv-2010.pdf)

Spawning Surveys

Spawning surveys are a quantitative method to assess steelhead redd presence and vulnerability to livestock disturbance and may also be used to assess compliance with the level of “take” authorized within a Biological Opinion. The Forest has developed a strategy to avoid redd trampling “take” of steelhead and bull trout (see Appendix F).

Uplands Monitoring

Beginning in the 1930s, permanent camera points were established on the Malheur National Forest. Their purpose was to monitor the effects of management on the resources of the Forest (Fifty Years of Change on the Range, R6-Mal-035-89). Many camera points have been re-photographed a number of times. This monitoring will continue.

In the 1950s and early 1960s Parker Three-Step C&T (Condition & Trend) Transects were installed throughout the Forest. The majority of these were established in the uplands. Over the last five years some of these transects have been re-examined. The procedure has been to read the transect using the original Three-Step method and then reread the transect using a modified Daubenmire cover/frequency method (see Technical Reference 1734-4). This allows comparisons between old and new information to determine ecological condition and trend and establishes a baseline using the more accurate cover/frequency method for gathering future data. The re-examining of these established transects will continue. If new trend transects are established the modified Daubenmire cover/frequency will be used.

There are a variety of additional or other monitoring methods available for use**.** The method or methods to be used will depend on the questions needing to be answered and considering other priorities. In some cases ocular observation (qualitative) will be sufficient to measure utilization, but when specific concerns are identified the forest may need quantitative methods such as Paired Clipped plots or development and use of height/weight curves may be necessary. Some of the more commonly used methods can be found in *“Utilization Studies and Residual Measurements”* (Interagency Technical Reference 1996, BLM/RS/ST-96/004+1730). (Please refer to ***Malheur National Forest Range Monitoring Guideline s***, October 16, 2006 for additional accepted methodology)

All of the monitoring methods used by the Forest are also intended to facilitate communications between forest range and resource personnel, grazing permittees and consulting agency personnel. This will largely be accomplished through participation and one-on-one interaction during the interdisciplinary, on the ground implementation.

4 PROPOSED ACTION AND ESA ACTION AREA

The MNF used the LRMP direction and policies presented in Section 3 to design the 2012-2016 proposed grazing action for Donaldson, Deer Creek and Indian Ridge Allotments. Public laws such as Clean Water Act were considered. The development of the project design criteria, grazing end-points and grazing strategies for the Donaldson, Deer Creek and Indian Ridge allotments considered the PACFISH RMOs and Grazing Management Standards, desired conditions and standards from amendment 29 to the MNF LRMP, PACFISH livestock grazing guidelines (Enclosure B) and MSRAs (Appendix G). Forest policies on Riparian Monitoring and MSRAs were also informed by the LRMP direction and Clean Water Act too. Examples of resource objectives and their sources include:

- Greenline successional status value of at least 61, indicating late seral or the current value, whichever is greatest (Winward 2000, Burton et al. 2008) was developed in response to the PACFISH Enclosure B revision;
- Woody species regeneration sufficient to develop and maintain healthy woody plant communities (diversity of age and structure classes) was developed in response to MNF LRMP Amendment 29;
- Bank stability criteria (80% or current value, whichever is greatest for non-priority watersheds; at least 90% or current value, whichever is greatest, for priority watersheds) were from PACFISH;
- Water temperature criteria are from the MNF LRMP; and
- Width-depth ratio criteria are from PACFISH

The above resource objectives from the Forest direction and policies (See Section 3) are long term objectives that are achieved by developing a proposed action with project design criteria and annual monitoring indicators.

4.1 PROPOSED ACTION

Donaldson Allotment

The Donaldson Allotment is located at the Southwest end of Fox Valley on National Forest System Lands, mostly within T. 11, and 12 S, R. 28, and 29 E. The Allotment encompasses approximately 8,000 acres. The allotment is divided into 2 pastures: Glide and Hinton, each approximately 4,000 acres in size (Figure 1).

Deer Creek Allotment

The Deer Creek Allotment is located southwest of the town of Hamilton on National Forest System Lands, mostly within T 10S, and R. 28, R. 29 E. The Allotment encompasses approximately 2,100 acres and consists of one pasture. Private land borders to the north, west, and south; and 800 acres of private land in the middle of the allotment (Figure 2).

Indian Ridge Allotment

The Indian Ridge allotment is located 3 miles northwest of the town Fox, Oregon on National Forest Lands, mostly within T. 9 and 10 S, and R. 29 and 30 E. Private land is located on the North and South sides of the allotment and elevations range from 4,500 to 5,000 ft. The allotment encompasses approximately 4,000 acres and contains five pastures: West, East, Boothill, Ridge, and Highway (Figure 3).

4.1.1 PERMIT INFORMATION AND GRAZING SYSTEMS

Donaldson Allotment

The Donaldson Allotment is currently permitted for 100 cow/calf pairs (599 AUM’s) from 6/15 to 10/30. Permit number, permitted livestock numbers, and permit issuance and expiration dates are identified in Table 6.

Grazing System:

- The Donaldson Allotment consists of two main pastures.
- The Donaldson Allotment will be managed using a rest rotation grazing system.
- Range Readiness and utilization levels may vary on/off dates within the parameters of authorized use.

Deer Creek Allotment

The Deer Creek Allotment is currently permitted for 88 cow/calf pairs (371 AUMs) from 6/11 to 09/15. Permit number, permitted livestock numbers, and permit issuance and expiration dates are identified in Table 6.

Grazing System:

- The Deer Creek Allotment’s grazing rotation system will be a rest rotation.
- Range Readiness and utilization levels may vary on/off dates and pasture rotations within the parameters of authorized use.

Indian Ridge Allotment

The Indian Ridge Allotment is currently permitted for 94 cow/calf pairs (396 AUM’s) from 6/11 to 9/15. Permit number, permitted livestock numbers, and permit issuance and expiration dates are identified in Table 6.

Grazing System:

- The Indian Ridge allotment consists of five pastures.
- The Indian Ridge Allotment grazing rotation system will be deferred rotation using the four larger pastures.
- Range Readiness and utilization levels may vary on/off dates within the parameters of authorized use.

TABLE 6. PERMIT INFORMATION FOR THE DONALDSON, DEER CREEK AND INDIAN RIDGE ALLOTMENTS.

Allotment	Permit Number	Permitted Livestock (Cow/Calf Pairs) / AUMs	Permit Issuance Date	Permit Expiration Date
Donaldson	01717A	100 / 599	05/20/2009	12/31/2018
Deer Creek	01717A	88 / 371	05/20/2009	12/31/2018
Indian Ridge	01829	94/396	03/07/2006	12/31/2015

4.1.2 PROJECT DESIGN CRITERIA

The following project design criteria (PDC) will be used to minimize or eliminate adverse effects of the PEs on MCR Steelhead and designated CH. The MNF regards these PDC as integral components of the proposed action and expects that all proposed project activities will be completed consistent with those measures.

1. Management will be framed in a manner that will allow managers to manipulate grazing strategies (dates, stocking levels, rotational patterns) depending on annual environmental factors and permittee success at meeting standards during the previous year.
2. Permittees must maintain perimeter and interior fences prior to turn-out.
3. Standards that are required of the permittee (e.g., turn on dates, move triggers, end point standards) will be outlined in an addendum to Part III of the grazing permit.
4. MSRA will be located and used to identify stream sections that are most vulnerable to livestock impacts. Identifying MSRA locations will guide application of bank alteration values.
5. Spawning surveys will occur within all pastures containing MSRA’s where turn out is expected to occur prior to June 30. Of the remaining CH reaches 20% will be randomly surveyed for redds where turn out is prior to June 30 (See Appendix F. Strategy to minimize Redd Trampling “Take” of Steelhead and Bull trout).
6. Where there is significant risk for redd trampling, the Forest and permittees will utilize a number of tools to protect redds, which include but are not limited to: alternative rotation, rest, exclusion with water gaps, temporary electric fences, additional riding.
7. Complete all required monitoring at PIBO Effectiveness Monitoring DMAs. DMA's to be monitored are provided to the Forest yearly by the EM Team via the Regional Office. This will effectively satisfy Interagency Implementation Team (IIT) monitoring requirements.
8. The Forest Service will visually inspect riparian livestock use in each pasture containing steelhead CH near the mid-point of the grazing rotation for that pasture, and will conduct applicable Multiple Indicator Monitoring (“MIM”) on any such pasture where it appears that riparian conditions are approaching one or more move triggers or end-point indicators. This will help meet our long term riparian resource objectives.

9. Annual use indicators will dictate when livestock are moved between units or off the allotment, within the terms of the term grazing permit, including moves in response to fish spawning. This will help us meet our long term riparian resource objectives.
10. The Forest Service will provide the Services with an End of Year Grazing Report by March 1 of each year.
11. Use of roads and off-road travel by permittees and staff will follow these PDC:
    a. Vehicles are not authorized to travel through seeps, springs or streams except for use of existing fords on road crossings;
    b. All refueling activities and fuel storage will occur at least 150 feet away from live streams;
    c. OHV routes within 100 feet of streams will be camouflaged so that access routes do not become new trails and minimize disturbance to riparian vegetation;
    d. OHV travel off established roads within 100 feet of streams would occur only during periods when soil is dry.

4.1.3 GRAZING USE INDICATORS AND SUPPORTING SCIENTIFIC RATIONALE

The Forest Service's Regions 1, 4, 6 and Bureau of Land Management's Idaho, Montana, Nevada, Oregon and Washington have made commitments through the PACFISH and INFISH Management Strategies to protect and improve aquatic resources found in the interior Columbia River basin. Since the Forest Service Pacific Northwest Region (Oregon and Washington) which includes the Malheur National Forest began implementing these strategies, there has been marked improvement in management of aquatic resources. To strengthen the implementation of the aquatic strategies, an interagency group consisting of deputies from the various action and regulatory agencies (Deputy Team) was formed to provide oversight of the strategies and subsequent biological opinions commonly known as PIBO. Under the Deputy Team oversight, an implementation monitoring module was developed for livestock grazing, and its application is required where listed fish species occur in the interior Columbia River basin. Compliance with these requirements is monitored and presented to the Deputy Team during their annual reviews.

The PNW region requires application of the PIBO implementation and effectiveness monitoring program for National Forest LRMPs amended by PACFISH and INFISH, and the regional office annually coordinates the PIBO monitoring programs with the National Forests with listed fish species. FS line officers continue to work with their staffs and grazing permittees to ensure that implementation monitoring requirements are met. As described in the PIBO monitoring strategy and the annual regional coordination letter, the Forest established Designated Monitoring Areas (DMAs) and annually monitors the grazing use indicators at these PIBO DMAs as well as DMAs established by the MNF (Figure 1).

Data collected at the PIBO effectiveness monitoring DMAs reflect the grazing use indicators applicable to stream banks and stream channels. Accordingly, the regional monitoring coordination letter identifies the following requirements will apply to these DMAs:

A. Measurements will be on the greenline (first perennial vegetation above the channel). Measurements must include, at minimum: 1) bank alteration and 2) stubble height if any herbaceous vegetation is present.

B. Where woody riparian vegetation dominates the DMA with little or no herbaceous vegetation along the greenline, woody use (browse) should be measured and may be sampled in lieu of stubble height.
C. These measures will be made using the current MIM protocol.

Therefore, the grazing use indicators required by the PIBO and used by the Forest riparian monitoring programs at all DMAs are: browse of woody vegetation, stubble height of greenline vegetation and streambank alteration. Woody vegetation browse is used to regulate impacts on woody recruitment to streams, greenline stubble height is used to regulate grazing impacts on greenline ecological status and streambank alteration is used to regulate grazing impacts on streambank stability and channel width. For consistency with the PIBO monitoring program and regional direction regarding coordination with it, the Forest elected to use the current MIM for their monitoring protocol.

The MNF utilizes move trigger and endpoint (annual) indicators to manage livestock. The underlying concept behind the use of end-point indicators for livestock grazing management is that the selected end-points, if not exceed, will allow for the attainment of or reasonable progress to be made toward desired conditions for riparian areas and fish habitat as described in Section 3 – Malheur NF LRMP and Section 4 – Proposed Action.

The MNF developed values for livestock move trigger and annual endpoint indicators (Table 7 and 8). The ranges of values are starting points based on research and the MNF’s for establishing desired riparian conditions. The end-point indicator values (allowable use in riparian areas) are, to the extent feasible and appropriate data are available, be site-specifically designed to prevent any meaningful carry-over effects. They also provide for the evaluation of management practices to determine if they are effective in maintaining the desired and/or proper functioning condition, or improving the structure and function of riparian and aquatic conditions. These values could be adjusted as more site-specific information is gathered. End-point indictors (allowable use in riparian areas) should be adjusted for timing, intensity, frequency, and duration. The rationale for the development of the move trigger and end-point grazing use indicators is discussed below.

Livestock grazing along the greenline of stream channels will be limited to attain the numeric move trigger and end-point indicator values in Table 7, 8 and 9.

TABLE 7. DONALDSON ALLOTMENT LIVESTOCK MOVE TRIGGER AND END-POINT INDICATORS BY PASTURE.

Pasture Name/ DMA or Key area Name / Creek Name	**Monitoring Attribute**	**Key Species**	**Move Trigger**	**Endpoint Indicator**
Glade Pasture/Suitable monitoring location not yet identified MSRA-present Rest Rotation	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		15%	20%

Upland Sites (All Pastures)	% Utilization	Upland grass species	35%	45%
Riparian Areas (All Pastures)	% Utilization	Riparian grass species	35%	45%

Monitoring of the Donaldson Allotment for compliance with the terms and conditions of the permit has been with quantitative measurements of Upland Utilization from 2007 through 2010 shown in Table 8. below. The maximum percent utilization allowed is 45%.

Table 8. Donaldson Allotment Upland Utilization Monitoring Results

Monitoring Year	**2007**	**2008**	**2009**	**2010**
Average percent upland utilization	23%	11%	23%	38%

Table 9. Deer Creek Allotment livestock move trigger and end-point indicators by pasture.

Pasture Name/ DMA or Key area Name / Creek Name	Monitoring Attribute	Key Species	Move Trigger	Endpoint Indicator
Deer Pasture/DMA yet to be determined MSRA-present Rest Rotation	Browse use		40%	50% (early season use) 40% (late season use)
	Greenline stubble[1]	Deep-rooted hydric spp.	4 in.	4 in. (early season use) 6 in. (late season use)
	Streambank Alteration		15%	20%
Upland Sites (All Pastures)	% Utilization	Upland grass species	35%	45%
Riparian Areas (All Pastures)	% Utilization	Riparian grass species	35%	45%

Monitoring of the Deer Creek Allotment for compliance with the terms and conditions of the permit has been with quantitative measurements of Upland Utilization from 2007 through 2010 shown in Table 10. below. The maximum percent utilization allowed is 45%.

TABLE 10. DEER CREEK ALLOTMENT UPLAND UTILIZATION MONITORING RESULTS

Monitoring Year	2007	2008	2009	2010
Average percent upland utilization	25%	Rested	28%	Rested

TABLE 11. INDIAN RIDGE ALLOTMENT LIVESTOCK MOVE TRIGGER AND END-POINT INDICATORS BY PASTURE.

Pasture Name/ DMA or Key area Name / Creek Name	Monitoring Attribute	Key Species	Move Trigger	Endpoint Indicator
Upland Sites (All Pastures)	% Utilization	Upland grass species	35%	45%
Riparian Areas (All Pastures)	% Utilization	Riparian grass species	35%	45%

Monitoring of the Indian Ridge allotment for compliance with the terms and conditions of the permit has been completed with quantitative measurements of average upland and riparian utilization averages from 2006 through 2010 shown in Table 12 below. The maximum percent utilization allowed is 45%.

TABLE 12. INDIAN RIDGE ALLOTMENT MONITORING RESULTS

Monitoring Year	2006	2007	2008	2009	2010
Averages of utilization from upland and riparian	19%	30%	28%	13%	20%

Rationale to Support the Range of Initial Values for Selected End-Point Indicators/Condition Thresholds/Allowable Use Criteria

Stubble Height: 4-6 inches. Stubble height has been identified as being related to the physiological health and vigor of individual plants/communities as well as the ability of vegetation to protect streambanks and filter during overbank flows, although by itself it is generally not sufficient to establish a relationship between grazing and riparian vegetative conditions. Research is limited, but the literature generally suggests 4-6 inches of residual stubble height allows for improved riparian grazing management and provides for adequate riparian protection. Clary and Leininger (2000) conducted studies on stubble height and its ability to improve riparian habitats and to capture and stabilize sediment. They concluded that stubble heights of 4-6 inches appear to stabilize the greatest amount of sediment. Clary (1999) states that by maintaining stubble heights of 4-5.5 inches allowed for streambank recovery. End-point indicator values are intended to vary by site depending on similarity to desired conditions and the resiliency of the site being monitored (University of Idaho Stubble Height Study Team 2004, Clary and Leininger 2000, Clary et al. 1996, Hall and Bryant 1995, Appendix B - PACFISH Enclosure B, Clary and Webster 1989). Stubble height is an annual use indicator that should be used in combination with long-term monitoring of vegetation and stream channel attributes.

Bank Alteration: 10-30%. In general, the most widespread impact livestock have on riparian areas is trampling stream banks (Bengeyfield, 2006). Like stubble height, streambank alteration is another annual or short-term indicator used to evaluate the potential effects of livestock grazing in riparian areas, primarily evaluating potential effects to long-term streambank stability and channel shape. It is used as a tool to assess the intensity of grazing along streambanks and to determine when such intensity may be appropriate or deemed excessive. It can also prove useful in determining the cause-and-effect relationships between livestock grazing and stream channel conditions and whether management changes are needed for the following year. Streams are naturally dynamic and have the ability to repair a certain amount of annual disturbance each year (the amount is variable based upon stream gradient, substrate composition, streambank materials, vegetation type and abundance, channel geometry, flow regime, etc.). Again, although the literature is not extensive, it generally suggests that 10-30% of annual streambank alteration is consistent with providing adequate riparian protection, and is intended to vary by site depending on similarity to desired conditions and the resiliency of the site being monitored (Burton et al. 2011, Heitke et al. 2008, Bengeyfield 2006, Cowley 2002, Bengeyfield and Svoboda 1998). Bengeyfield (2006) found that when streambank alteration measured 15-20%, width to depth ratios showed an improving trend. He also noted that the vegetation improvements kept pace with the physical changes.

The streambank alteration procedure described here is an intercept procedure recording presence/absence of current year's disturbance along the greenline. It is not a measure of the percent of the area of streambank altered, but rather an estimate of the percent of the length of bank altered along the greenline based on the presence or absence of a hoofprint(s) intercepting one (or more) of the five lines within a plot. This procedure samples only that part of the streambank associated with the greenline, often at the top of the streambank, and only within a 42-by-50cm plot. The streambank may be wider or narrower than the width of the plot.

Streambank alteration is an annual use indicator that should be used in combination with long-term monitoring of streambank stability and channel geometry. In addition, it is worth noting that research is continuing to be conducted on the various ways that can be used to monitor for and measure actual streambank alteration (including MIM, which the District is presently using) to account for accuracy of results, reduction of variability among observers, and the resources necessary to carry out such measures.

Mean incidence of use on woody species: 30-50%. Woody vegetation is an important component of many stream/riparian ecosystems as it can provide a strong root system, filter sediment, and provide stream shade and habitat diversity. Woody species browse is a short-term indicator of grazing utilization of woody species. Overall, there is generally a reduction in seed production of woody plants that receive more than 55 percent utilization, and when heavy and severe utilization levels are sustained over time overall plant health, including size and root strength, is reduced. Although the literature is not extensive, it generally suggests light to moderate allowable use on woody species (~30-50%) can be sustained and not meaningfully impede the potential for improved conditions of affected woody plant communities; and is intended to vary by site depending on similarity to desired conditions and the resiliency of the site being monitored (Winward 2000, USDI BLM 1996, Appendix B-PACFISH Enclosure B). Woody species browse is an annual use indicator that should be used in combination with the long-term monitoring indicators of woody species age class and greenline composition to help determine the health of woody plant communities.

Livestock grazing along the greenline of stream channels will be limited to attain the numeric move trigger and end-point indicator values in Table 11. The numeric values in Table 11 are considered starting points for allowable use since values could be adjusted as more site-specific information is gathered.

Initial Values for Grazing Use Indicators

Based on the best available science, applied science publications, and professional judgment, the Forest interdisciplinary team selected initial values for each indicator. The season of use determined the initial values of endpoint indicators for woody shrub use and stubble height of greenline vegetation. The early season initial values for shrub use and stubble height are 50% and 4 inches, and the late season initial values for shrub use and stubble height are 40% and 6 inches, respectively. Grazing use in the early season allows time for vegetation growth after livestock use. The exact dates and times of early and late season can vary across the Forest and between given years, and therefore are not specified. However, to provide some typical guidelines, early season is usually defined as the beginning of the growing season to mid-July and late season from mid-August to the end of the growing season.

To determine an initial value for the streambank alteration grazing use indicator, the Forest also looked a Regional Technical Team (RTT) report prepared under the Streamlining Consultation Procedures resolution process. The NMFS had stated that “The best available science indicates that the 10% and 20% bank alteration levels are appropriate in preventing bank destabilization and protecting habitats critical to listed fish.” Their position paper cited numerous references to support these values. The RTT reviewed documents cited by NMFS, and they concluded that NMFS had reasonably established a causal link between streambank alteration-related habitat effects caused by livestock grazing activity and the taking of the species (i.e., grazing will affect stream channel conditions that will affect fish habitat conditions such as water quality, food, cover, etc.). The literature generally supports the concept that increased streambank alteration will, at some point, adversely affect stream channel conditions, and therefore fish habitat conditions. However, there was uncertainty relative to the percentage of streambank alteration at which habitat conditions were significantly altered and take of the species is likely to occur.

There is little field research supporting any specific percent streambank alteration standard using a defined and repeatable measurement protocol. The above RTT report and citations provide recommendations and professional judgments that range from 10% to 30% streambank alteration, but do not present empirical evidence from grazing monitoring data to support the percentages. The Forest interdisciplinary team recognizes a connection between the streambank alteration grazing use indicator and long term fish habitat conservation objectives in the LRMP, but couldn’t determine a consensus value. Therefore, the Forest interdisciplinary team selected an initial value of 20% streambank alteration for endpoint grazing use indicator which is the statistical median of the range.

Adjustments to Values of Grazing Use Indicators and/or Grazing Strategy

The interdisciplinary team considers available information on riparian condition (eg. succession status of greenline vegetation and woody species regeneration) and presence of MSRAs to adjust values of grazing use indicators and/or the grazing strategy. Information wasn't available for the successional status of the greenline and woody species regeneration for the pastures in this allotment. Therefore, it didn't affect the values of the grazing use indicators in Table 11. However, the presence of MSRAs resulted in reductions of the streambank alteration values for several pastures.

Criteria used to evaluate the riparian condition (eg. succession status of greenline vegetation and woody species regeneration):

When these conditions apply:

- Greenline plant communities show moderate to high similarity to desired condition class/seral stage -- greenline successional status value is 41% or greater (mid-late seral) as defined by Winward (2000); *and/or*
- Stream/riparian systems have been assessed as being in Properly Functioning Condition or Functioning-at-Risk (high to moderate) category (Prichard et al. 1998); and/or
- Riparian/channel attributes are near desired conditions (see Table 13) in a Unit,

Then allowable use within riparian areas will be:

1. <40-50% browse on both clumped, multi-stemmed species (i.e. most willows (*Salix spp.*) and single-stemmed species (i.e. coyote willow (*Salix exigua*), birch (*Betula spp.*), alder (*Alnus spp.*), cottonwood or quaking aspen (*Populus spp.*)) i.e. <50% browse if early season use, and <40% browse for mid and late season use[2]; and
2. >4-6 inch residual stubble height (will vary based on greenline successional status/seral stage, and season of use) i.e. >4 inches if early season use, and >6 inches for mid and late season use; and
3. Allowable bank alteration will be limited to 20% streambank alteration[3] by large herbivores (% of linear length of greenline altered) (Multiple Indicator Monitoring (MIM) of Stream Channels and Streamside Vegetation (Interagency Technical Reference 1737-23 2010)[4]. The estimated combined variability, observer error and

[2] The exact dates and times of "early", "mid" and "late" can vary across the Forest and between given years, and therefore are not specified. However, to provide some typical guidelines, "early" is usually defined as the beginning of the growing season to mid-July, "mid" season from mid-July to mid-August, and "late" season from mid-August to the end of the growing season.

[3] The allowable level of bank alteration for a specific site should allow for no more than 5% of the lineal bank distance (includes both sides of the stream) displaying evidence of new bank instability that has become perceptible after livestock grazing is initiated in a pasture. Note: hoof prints by themselves are not a sign of instability unless they move the bank by > 10 cm (direct shearing or sloughing of the bank).

[4] Research is presently ongoing, which may result in a new and or modified method of measuring Bank Alteration. If in fact this occurs the PIBO EM Team and or other researchers would present findings and provide a cross walk and rational to the existing monitoring method and endpoint indicators.

sampling error or sample size, results in a 95% confidence interval of 6% for this bank alteration monitoring method. Thus, by setting a trigger for moving livestock at ~14%, we can be reasonably confident that livestock would be off the pasture before an additional 12% alteration was reached. The upper level for reasonable confidence would be 26% -- which represent an upper limit for the associated conservation measure.

However, when these conditions apply:

- When greenline plant communities show low similarity to desired condition class/seral stage -- greenline successional status value is less than 41 (early seral) as defined by Winward (2000); and/or
- Stream/riparian systems have been assessed as being in a *Functional-at-Risk (low) to Non-Functional category* (Prichard et al. 1998) {a Non-Functional system is one that clearly does not provide adequate vegetation, landform, or large woody debris to dissipate stream energy associated with high flows and thus are not reducing erosion, improving water quality, etc.; there is an absence of certain physical attributes such as a floodplain where one should be} in a Unit,

Then,

1. Consider resting the area/s for one or more years until condition reaches moderate similarity for those riparian areas with moderate and low gradient channels, such as Rosgen "B" and "C" channel types, with substrates composed of medium to fine easily eroded materials; or
2. If grazing is allowed, use should be for only short duration (i.e. to facilitate moves, etc.) and during a period of least environmental impacts

Most Sensitive Riparian Areas:

The MNF has identified stream reaches of high quality steelhead spawning and rearing critical habitat called Most Sensitive Riparian Areas (MSRAs). The process and criteria for identifying MSRAs is described in detail in Appendix G- Methods for determining Most Sensitive Riparian Areas in relation to Mid Columbia River Steelhead. The miles of MSRA by stream and location in the allotment are displayed in Table 3 and Figure 2, respectively.

MSRAs are typically steelhead critical habitat that is most accessible and sensitive to livestock use. MSRA and the grazing strategies described below are part of the proposed action. Certain grazing strategies can be used to minimize livestock and stream interactions and promote maintenance of, or recovery towards, desired conditions. Pastures containing MSRA that include one or more of the following grazing strategies would result in allowable use levels of 20% bank alteration versus the more restrictive standard of 15%:

- Rest Rotation – 1 year of complete rest during a grazing cycle (grazing cycle is typically 3-4 pastures)
- Double Rest Rotation – pasture is rested for two consecutive years, then grazed either early or late to following year depending on recovery needs (i.e. herbaceous or shrubs)

- Corridor Fencing – complete rest from grazing for a specified period of time or until specified objectives are met.

If at any point during this consultation a permittee adopts one or more of the strategies listed above the endpoint indicator would be adjusted to reflect such management changes in the annual instructions.

Other useful tools to minimize riparian use include – using a full-time rider (7 days/week), using electric fence, using low-stress stockmanship, placing low-moisture nutrient supplement blocks (as well as using other supplementations) in uplands, less than 21 days grazing duration in any pasture during the hot season (typically mid and late seasons, or mid-July to end of growing season). The use of these tools will be evaluated by the IDT on an annual basis to determine if the level of allowable use would be raised to 20% bank alteration. If none of these tools are in place, allowable use will remain at the 15% bank alteration.

4.1.4 MONITORING

The Malheur National Forest monitoring strategy for determining condition and trend of riparian ecosystems as they relate to grazing activities was described in detail in Section 3.2. The goal is to determine site-specific desired riparian/stream channel conditions and the levels of allowable use (annual indicators also known as end-points) that will improve conditions that are not at the desired and/or proper functioning condition. The assessments and monitoring protocols used, as well as the values for desired conditions and allowable use, are intended to be an important part of the adaptive management process and are subject to changes or modifications based on new scientific findings and improvements in methodologies as well as changes in definitions and policy.

The annual indicators are used in implementation monitoring to ensure that grazing does not prevent the attainment of the desired conditions. Riparian annual use indicators used on the Malheur National Forest include greenline stubble height, bank alteration, and woody browse. Greenline stubble height is used to regulate grazing impacts on greenline ecological status, bank alteration is used to regulate grazing impacts on bank stability, and woody browse is used to regulate impacts on woody recruitment. The specific indicators selected for a specific unit should be those that correspond with the riparian resources that are most sensitive to the impacts of livestock grazing. For example, if bank stability was the riparian feature most likely to be impacted by livestock grazing in a unit, then bank alteration would be selected as the annual use indicator for that unit.

Annual use indicators will be measured at key areas by key species (on uplands) and at DMA greenlines annually. Key areas are monitoring sites chosen to reflect the effects of grazing over a larger area (Burton et al 2008). Key species are preferred by livestock and an important component of a plant community, serving as an indicator of change (Coulloudon et al 1999). The Interagency Technical Reference or other best available science would be used to monitor grazing use. The MIM Interagency Technical Bulletin (Burton et al 2008) or other best available science would be used to monitor grazing use at DMAs. The Forest Service will monitor annual use indicators. Triggers will be used by permittees as a tool to help ensure annual use indicators are met. Endpoint indicators will be monitored by MNF personnel at designated monitoring areas (DMAs), following the MIM protocol (Burton et al. 2010). Move trigger evaluations will be conducted by the permittee.

Effectiveness (riparian objective) monitoring is designed to address the question of whether or not management practices currently applied to the area are achieving the desired results. These procedures are designed to assess the current condition and measure changes in streambanks, channels, and streamside vegetation over time, i.e., trend. They help determine if local livestock grazing management strategies and other land management actions are making progress toward achieving the long-term goals and objectives for streamside riparian vegetation and aquatic resources. The goal is to conduct effectiveness monitoring every three to five years on riparian areas and streambanks. This period of time is considered to be the minimum necessary to detect changes, although unusually wet years and/or flood events may result in short-term changes that validate the need to monitor more frequently, or at least at the time of the event. Budget and personnel constraints may limit the extent in which monitoring of this type will be conducted.

Presently, effectiveness monitoring includes: modified greenline composition (adapted from Winward 2000 and USDI BLM 1996a), woody species height class (Kershner et al. 2004), streambank stability and cover (adapted from Kershner et al. 2004), woody species age class (adapted from Winward 2000), greenline-to-greenline width (Burton et al. 2008), substrate (Bunte and Apt 2001), and residual pool depth and pool frequency (Lisle 1987). These provide data and information concerning the present conditions and trend of riparian vegetation, channels, and streambanks, and to help determine if aquatic systems are being degraded, maintained, or restored across the Malheur National Forest.

4.1.5 ADAPTIVE MANAGEMENT

The adaptive management strategy described below and depicted in Appendix H diagrams 1.0 (Long-term) and 2.0 (Annual) is intended for allotments requiring consultation. It is designed to provide the MNF the ability to make management decisions based on new information, changing conditions, or the results of implementation/effectiveness monitoring. Adaptive management will be used to ensure: 1) sites at desired condition remain in desired condition; 2) sites not in desired condition have an upward trend; and 3) direction from consultation with the Services is met.

The overall strategy consists of a long-term adaptive management strategy and an annual adaptive management strategy. The long-term strategy describes how adaptive management will be used to ensure the three objectives previously stated are achieved and to maintain consistency with Forest Plan level direction. The annual adaptive management strategy describes how adjustments will be made within the grazing season to ensure annual use indicators and other direction from consultation is met, it also describes when and how regulatory agencies will be contacted in the event direction from consultation is not going to be met.

Ideally, the value associated with the annual use indicator is customized to the specific circumstances in each unit. However, customizing this value generally requires a significant amount of data and/or experience with a particular unit. As data is gathered and analyzed the annual use indicators may be adjusted to reflect the new information.

The annual use indicators within the Multiple Indicator Monitoring (MIM) method will be used to detect the annual use of wild horses, wildlife, and livestock at the end of a grazing period or growing season, whichever occurs first. Although the Proposed Action includes a suite of measures designed to avoid such an outcome, the MNF acknowledges that it is nevertheless possible that annual use indicators could be exceeded in a particular year. If this occurs, the

MNF proposes the adaptive management process to be initiated immediately and will make any necessary adjustments to the current or future grazing strategy to ensure that the exceedances do not recur.

When the annual utilization data is collected at the end of the growing season, the MNF will consider adjustments of livestock numbers, timing of grazing, and duration of grazing. Or, the MNF may choose to rest the pasture or allotment. However, when annual utilization data is collected at the beginning of a grazing period based on substantial historical pre-turnout use by wild horses or big game) and if utilization is already about to exceed or already exceeding standards, livestock would not be allowed into the pasture. If the wild horse AML and/or big game populations exceed ODFW Management Objectives, appropriate coordination will occur among the agencies.

If there are recurring exceedances of annual indicators, or if there is a failure to comply with the terms and conditions of the grazing permit, the issuance of a Notice of Non-Compliance may be warranted. This notice, issued to the permittee(s), is likely to be in addition to the outcomes that result from following the adaptive management process described above. The issuance of a Notice of Non-Compliance and resulting action taken by the MNF will be consistent with FSH 2209.13 Section 16 and 36 CFR 222.4. All exceedances of annual indicators and subsequent grazing strategy adjustment recommendations will be documented by the MNF in the annual EOY Report and presented to the Level I consultation team. A specific strategy for when the endpoint indicator for streambank alteration is exceeded is discussed in Section 4.1.5.1 below.

4.1.5.1 COMPLIANCE STRATEGY FOR THE STREAMBANK ALTERATION ENDPOINT INDICATOR

The MNF acknowledges that there is a ±6% margin of error associated with the MIM protocol (see section 4.1.3). Action would only be taken for permit violations and not as a result of wild ungulate or unauthorized use. The MNF will follow the strategy outlined below for exceedance of the bank alteration endpoint indicator. For each level of exceedance, the BMRD will incorporate adaptive management strategies into the following season's grazing strategy which may include: adjustments of livestock numbers, timing of grazing, or duration of grazing.

- **Measured bank alteration ≤ 6% over the endpoint indicator:** will be evaluated by the District IDT. The IDT will examine the level of measured use on stubble height and woody browse to determine if an exceedance of the endpoint indicator occurred. If the IDT concludes that the endpoint indicator has been exceeded the permittee will be contacted via phone or in person to notify them of the IDT findings. The permittee would be given 1 year to remedy. A follow-up letter will be sent to the permittee to document the verbal discussion and include what action is expected of the permittee to remedy the situation, to what standard, and by when (FSH 2209.13, 10, 16.2e).
- **Measured bank alteration 7-13% over the endpoint indicator:** the BMRD will, at a minimum, issue a notice of Non-Compliance for violation of terms and conditions of the term grazing permit and be given 1 year to remedy the non-compliance. Adjustments to the grazing strategy may be made following the adaptive management process. Failure to remedy the non-compliance during the following grazing season may result in a reduction of 25% of permitted AUMs for the following grazing season, **or** rest the pasture the following grazing season (FSH 2209.13, 10, 16.2e).

- **Measured bank alteration 14-20% over the endpoint indicator:** the BMRD will, at a minimum, issue a notice of Non-Compliance for violation of terms and conditions of the term grazing permit and will give the permittee 1 year to remedy the non-compliance. Adjustments to the grazing strategy may be made following the adaptive management process. When documented inspection indicates that the initial non-compliance has not been remedied as specified, or if a second situation of non-compliance has occurred, the permittee will be contacted by phone or in person describing the specific non-compliance. The BMRD will either reduce the authorized use by 25% of permitted AUMs for the following grazing season, **or** rest the pasture the following grazing season. A follow-up letter of a notice of permit action for non-compliance will be sent to the permittee indicating that a specified part of the permitted numbers or seasons is being suspended for a period of at least two years (FSH 2209.13, 10, 16.2e).
- **Measured bank alteration >21% over the endpoint indicator:** the BMRD will, at a minimum, issue a notice of Non-Compliance for violation of terms and conditions of the term grazing permit and will give the permittee 1 year to remedy the non-compliance. Adjustments to the grazing strategy may be made following the adaptive management process. When documented inspection indicates that the initial non-compliance has not been remedied as specified, or if a second situation of non-compliance has occurred, the permittee will be contacted by phone or in person describing the specific non-compliance. The BMRD will reduce the authorized use by 25% of permitted AUMs for the following grazing season, **and** rest the pasture the following grazing season using the adaptive management process. A follow-up letter of a notice of permit action for non-compliance will be sent to the permittee indicating that a specified part of the permitted numbers or seasons is being suspended for a period of at least two years (FSH 2209.13, 10, 16.2e).

Recurring non-compliance may lead to suspension of AUMs and/or the cancellation in part or whole of the Term Grazing Permit. Permit action involving the suspension or cancelation of grazing permits as per direction outlined in FSH 2209.13, 10, 16.2 and 36 CFR 222.4.

4.1.6 COORDINATION AND REPORTING

Reporting

Annual end-of-year (EOY) grazing reports are prepared by BMRD staff for all livestock grazing allotments. The reports include monitoring results, descriptions of any exceedance of grazing end-points and recommendations for management changes for the next grazing season. See monitoring section for a description of the grazing use and stream channel condition indicators for which information is collected, evaluated and reported. The report is sent to the NMFS and/or FWS by March 1 of each year.

Coordination

<u>EOY report.</u> Both internal and external coordination takes place regarding information and recommendations for changes in management found within the EOY report. The recommendations for changes in management in the EOY report are developed in an interdisciplinary manner. Typically, range conservationists, fish biologists, hydrologists, and the line officer will be involved. On occasion, wildlife biologists and botanists will participate.

Level 1 Team Meeting: A Level 1 team meeting is scheduled after a draft EOY report is sent to NMFS and/or FWS. The Level 1 Team discusses the draft EOY monitoring results, proposed remedies, and application of the compliance strategy (Section 4.1.5.1).

4.2 INTERRELATED ACTIONS

The regulations require the MNF to impose penalties for violation of prohibited acts on public lands. Unauthorized use is a prohibited act, and therefore is not a federal action. If unauthorized use occurs, the MNF's response could constitute a separate, interrelated federal action.

Unauthorized livestock grazing can occur in the allotment, and is reasonably certain to occur in the future. It is not a large problem in the allotments analyzed in this BA. Typically, it involves a few cow/calf pairs every few years.

Forest Service grazing regulations define unauthorized use, also known as "trespass," as occurring when livestock not under permit enter National Forest System (NFS) lands. It is a violation of 36 CFR 261.7. When unauthorized use occurs, the MNF attempts to identify and contact the owner of the livestock with instructions to remove the unauthorized livestock from NFS. The MNF can then bill the owner for the unauthorized use at the appropriate rate as identified in 36 CFR 222.50(h). If the ownership of the livestock is unknown, or the owner fails to comply with instructions to remove the livestock, the impoundment of said livestock by the MNF can occur as per 36 CFR 262.10.

4.3 PROJECT ELEMENTS

Project elements are the component parts of the action. Project elements will be assessed in the effects analysis section of the BA. Several of the project elements involve the use of vehicles on and off roads to access sites, such as four wheel drive trucks and OHVs.

1. <u>Livestock use of allotment/pastures</u>. Livestock will utilize the allotment/pastures consistent with the permitted numbers, season of use and grazing system described above and in the term grazing permit.
2. <u>Permittee management of livestock and infrastructure maintenance.</u> This includes move-in and move-out of cattle, herding, placement of nutrient (salt blocks) in the uplands, and maintenance of troughs, springs, ponds, fences and gates. Use of highway and off-road vehicles is included in this PE.
3. <u>Range improvements</u>. This includes the construction of fences for riparian pastures, and the construction/development of off-stream water sources.
4. <u>Exclusionary fencing</u>. Fences are constructed or placed to exclude areas from grazing. This is done to prevent livestock damage of riparian areas and in the case of electric fencing, to eliminate the potential for cattle stepping on redds.
5. <u>Monitoring</u>. A variety of implementation and effectiveness monitoring techniques are employed to determine if desired conditions are being met. The MNF Riparian Monitoring Strategy is discussed in detail in Section 4.1.4 below. Workers use manual and electronic equipment to measure vegetation, water quality and stream channel/streambed characteristics.
6. <u>Adaptive management.</u> An adaptive management strategy is designed to provide the MNF the ability to make management decisions based on new information, changing conditions, or the results of implementation/effectiveness monitoring. It will be used to

ensure: (1) Sites at desired condition remain in desired condition; (2) sites not in desired condition have an upward trend; and (3) direction from ESA consultation with NMFS is met. The adaptive management strategy describes how adjustments will be made to ensure annual endpoint indicators as well as other direction from this consultation are met, and describes when and how regulatory agencies will be contacted in the event direction from this ESA consultation is not going to be met. The MNF Adaptive Management Strategy is described in Section 4.1.5.

4.4 ESA ACTION AREA

The ESA action area for this consultation is defined by the Donaldson, Deer Creek and Indian Ridge Allotment boundaries (Figure 4). The ESA action area is displayed by cross-hatched area within the allotment boundary of the 6th field HUCs listed in Table 1. It should be noted that the action area includes the Indian Ridge Allotment due to presence of steelhead within Indian Creek. Figure 4 will be updated in the final version of this Biological Assessment to accurately depict the action area.

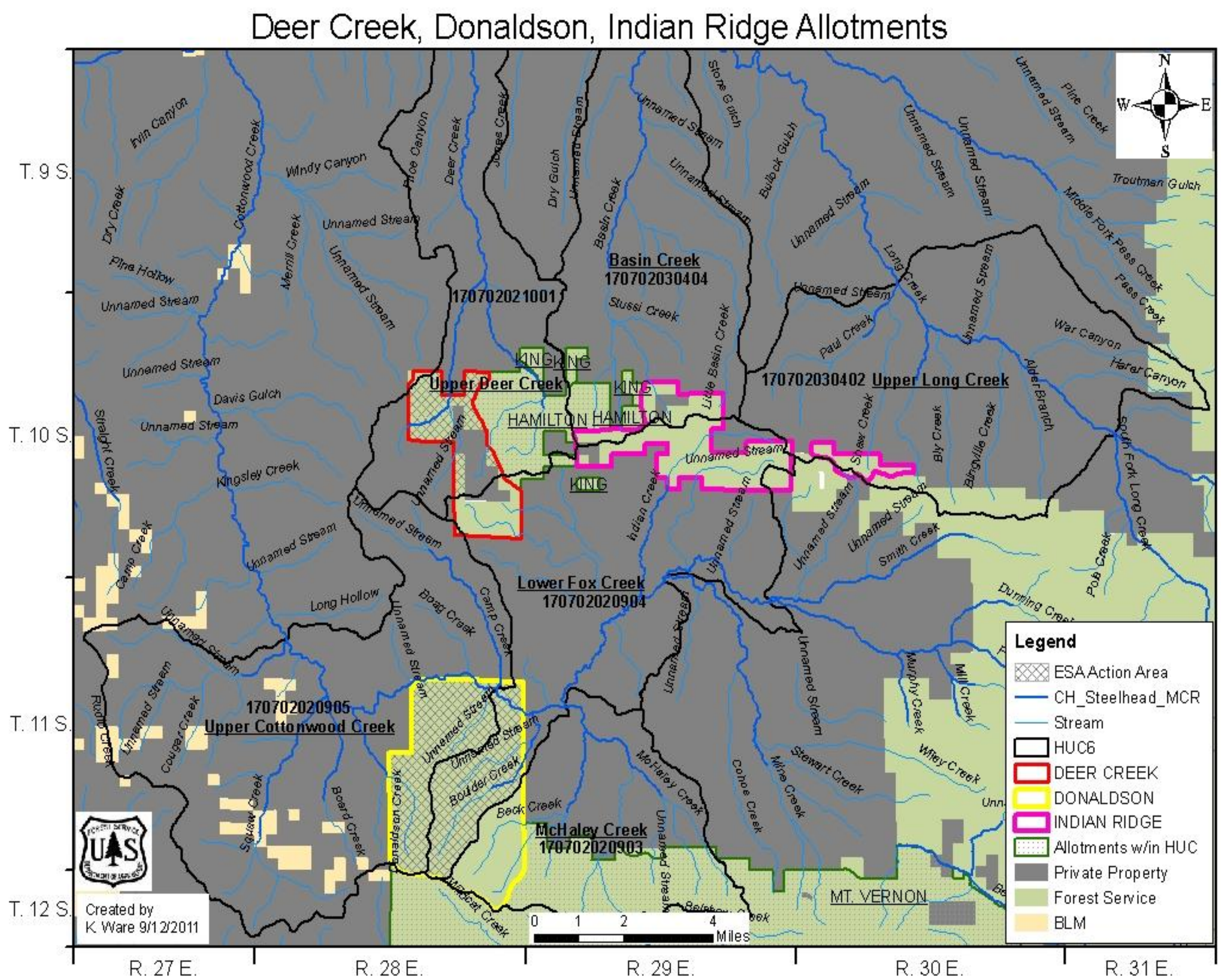

FIGURE 4. ESA ACTION AREA MAP FOR THE DONALDSON, DEER CREEK AND INDIAN RIDGE ALLOTMENTS CONSULTATION

5 STATUS OF THE SPECIES AND DESIGNATED CRITICAL HABITAT

The status of the Middle Columbia River Steelhead distinct population segment (DPS) and its designated critical habitat (CH) is presented in this section. No bull trout are found in the action area. Therefore, no description of the status of bull trout and its designated CH is presented.

5.1 MIDDLE COLUMBIA RIVER STEELHEAD DISTINCT POPULATION SEGMENT

5.1.1 LISTING HISTORY AND LOCATION

The Middle Columbia River Steelhead DPS was listed by NMFS as Threatened under the Federal ESA on March 25, 1999 (64 FR 15417). NMFS reaffirmed its threatened status on January 5, 2006 (71 FR 834). Protective regulations for MCR Steelhead were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42423). The NMFS revised the 4(d) protective regulations on June 28, 2005 (70 FR 37160).

The MCR Steelhead DPS includes all naturally-spawned populations of steelhead in streams within the Columbia River basin from above the Wind River in Washington and the Hood River in Oregon (exclusive), upstream to, and including, the Yakima River in Washington, excluding steelhead from the Snake River basin (64 FR 14517; March 25, 1999). The major tributaries occupied by this DPS are the Deschutes, John Day, Klickitat, Umatilla, Walla Walla, and Yakima River systems. The John Day River (JDR) probably represents the largest naturally spawning, native stock of steelhead in the region. The MCR Steelhead DPS does not include co-occurring resident forms of *O. mykiss* (rainbow trout).

5.1.2 LIFE HISTORY AND HABITAT REQUIREMENTS

Steelhead trout are the anadromous form of *O. mykiss*. Adult summer steelhead typically return to freshwater from June through September. Adults overwinter in large rivers while sexually maturing. Adults resume migration to spawning streams in early spring.

The JDR adult summer steelhead enter the lower river as early as September and as late as March, depending on water temperatures. Adult migration in the JDR generally peaks in October. The JDR below the North Fork JDR is used only for migration due to high summer water temperatures. Spawning takes place from March through May. Eggs incubate during the spring and emergence occurs from April through July depending on water temperatures. Juveniles typically rear for 2 to 3 years in freshwater before smolting and migrating to the ocean.

Juvenile steelhead generally utilize habitats with higher water velocities than juvenile Chinook salmon. In winter, juveniles utilize deep pools with abundant cover. Juveniles may reside in their natal stream for their entire freshwater rearing phase or may migrate to other streams within a watershed. Smoltification occurs during late winter and emigration to the ocean occurs during spring. Smolts outmigrate rapidly, taking 45 days or less to reach the ocean from upstream rearing areas. In the JDR below the North Fork, smolts generally stay within the thalweg, taking advantage of cover provided by depth and turbidity. Approximately 80% of the steelhead rear in the ocean for 2 years before returning to the JDR system as adults to spawn (PD BLM 2006).

5.1.3 MCR STEELHEAD POPULATIONS

The Interior Columbia Basin Technical Recovery Team (ICTRT) (2003) identified 15 populations in four major population groups (MPG) (Cascades Eastern Slopes Tributaries, John Day River (JDR), the Walla Walla and Umatilla Rivers, and the Yakima River) and one unaffiliated independent population (Rock Creek) in this steelhead DPS. There are two extinct populations in the Cascades Eastern Slopes Tributaries MPG, the White Salmon River and Deschutes River above Pelton Dam.

The JDR Subbasin contains the MCR Steelhead JDR MPG that consists of the Lower Mainstem John Day (LMJD), North Fork John Day (NFJD), Middle Fork John Day (MFJD), South Fork John Day (SFJD), and Upper Mainstem John Day (UMJD) populations (ICTRT 2003). The action area is associated with the UMJD and MFJD populations.

5.1.4 MCR STEELHEAD DPS VIABILITY STATUS

The status of a salmon or steelhead species is expressed in terms of likelihood of persistence over 100 years, or in terms of risk of extinction within 100 years. The ICTRT defined viability at two levels: less than 5 percent risk of extinction within 100 years (viable) and less than 1 percent risk of extinction within 100 years (highly viable). A third category, “maintained,” represents a less than 25 percent risk. The risk level of the steelhead DPS as a whole is built up from the aggregate risk levels of the populations and MPGs. The viable salmonid population (VSP) parameters (abundance, productivity, spatial structure, and diversity of the component populations) must be taken into account to determine the risk level.

The MCR Steelhead DPS does not currently meet viability criteria because its four component MPGs are not at low risk. However, for this DPS the outlook is relatively optimistic. One population, North Fork John Day, is currently at very low risk or “highly viable.” Two populations are currently viable (Deschutes Eastside, Fifteenmile); eleven are at moderate risk, with good prospects for improving. However, three large populations at high risk (Deschutes Westside, Naches, and Upper Yakima) are important to DPS viability; these present significant challenges.

Significant programs are underway for natural recolonization (White Salmon) or reintroduction (Deschutes Crooked River above Pelton Dam) of two of the extirpated populations to historically accessible habitat. Success of these programs should help improve overall DPS viability.

The MCR Steelhead Recovery Plan (NMFS 2009) presented viability ratings for the MCR Steelhead MPG. The risk of extinction is displayed as a combination of ratings for Spatial Structure/Diversity Risk and Abundance/Productivity Risk (Figure 5). The North Fork John Day MPG rates low/very low by the two criteria. The Middle Fork and South Fork MPGs rate low/moderate and the Lower Mainstem and Upper Mainstem MPGs have the highest extinction risk at moderate/moderate.

5.1.5 JOHN DAY RIVER MPG POPULATION STATUS

The current status of the MCR Steelhead John Day River MPG populations, showing 10-year geometric mean abundance by population, estimated productivity, and the minimum abundance threshold needed for long-term viability is summarized in Table 13. The table also includes the 10-year geometric mean proportion of hatchery spawners for the populations where data are available, and the risk ratings of high, moderate, low, and very low, for abundance and productivity combined, and spatial structure and diversity combined.

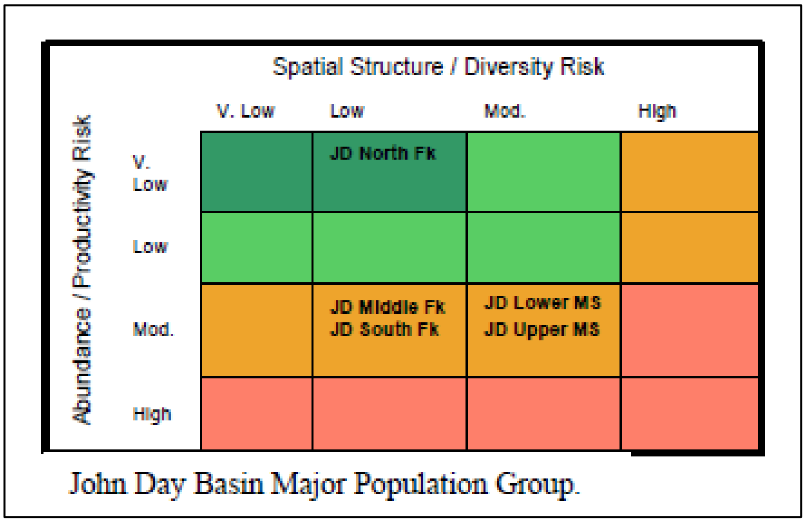

FIGURE 5. VIABILITY RATINGS FOR THE MCR STEELHEAD MPG (NMFS 2009). SHADES OF GREEN INDICATE LOWER RISK OF EXTINCTION AND SHADES OF RED INDICATE HIGHER RISK.

TABLE 13. MCR STEELHEAD JOHN DAY RIVER MPG - SUMMARY OF ABUNDANCE, PRODUCTIVITY, RISK RATINGS, AND MINIMUM ABUNDANCE THRESHOLDS (SOURCE: MIDDLE COLUMBIA RIVER STEELHEAD DPS RECOVERY PLAN SUMMARY 2009).

Population	Abundance Threshold[1]	Size Category	Run Timing	10-year Geomean abundance	Abundance Range	10-yr Hatchery Fraction[2]	Productivity[3]	Productivity Standard Error	A&P Risk Rating[4]	SSD Risk Rating
Lower Mainstem John Day	2250	Very Large	Summer	1800	563-6257	0.1	2.99	0.24	M	M
North Fork John Day	1500	Large	Summer	1740	369-10,235	0.08	2.41	0.22	VL	L
Upper Mainstem	1000	Intermed.	Summer	524	185-5169	0.08	2.14	0.33	M	M

John Day										
Middle Fork John Day	1000	Intermed.	Summer	756	195-3538	0.08	2.45	0.16	M	M
South Fork John Day	500	Basic	Summer	259	76-2729	0.08	2.06	0.27	M	M

1 Abundance threshold for viability based on habitat intrinsic potential

2 Average proportion of hatchery spawners over most recent 10 years in the data series.

3 Geomean return per spawner calculated over most recent 20 years in data series.

4 Abundance & Productivity Risk Ratings: H = high risk, M= moderate risk, L = low risk, VL = very low risk

5.1.6 POPULATION LIMITING FACTORS

The Middle Columbia River Steelhead ESA Recovery Plan (NMFS 2009) identified population limiting factors. For the NFJD population the primary tributary habitat limiting factors identified by the recovery planning team are degraded floodplain connectivity and function, degraded channel structure and complexity (key habitat quantity, habitat diversity, channel stability), altered sediment routing, water quality (temperature), and altered hydrology. For the MFJD population they are degraded floodplain and channel structure (key habitat quantity/diversity), altered sediment routing, altered hydrology, and water temperature.

The primary tributary limiting factors for the NFJD population include degraded floodplain connectivity and function, degraded channel structure and complexity (key habitat quantity, habitat diversity, and channel stability), altered sediment routing, water quality (temperature), and altered hydrology. Habitat limiting factors specific to streams within the population are displayed in Table 14.

TABLE 14. HABITAT LIMITING FACTORS IDENTIFIED IN NMFS (2009) FOR THE NORTH FORK JOHN DAY RIVER AND STREAMS WITHIN THE ESA ACTION AREA.

Limiting Factor	North Fork John Day River[1]	Cottonwood MaSA[1]
Degraded floodplain connectivity and function	X	X
Degraded channel structure and complexity	X	X

Altered hydrology		
Altered sediment routing	X	X
Water temperature	X	X
Degraded riparian communities		X
Man-made block to migration		
Impaired fish passage		

5.2 CRITICAL HABITAT FOR MIDDLE COLUMBIA RIVER STEELHEAD DPS

5.2.1 DESIGNATION HISTORY

Critical habitat (CH) was designated for MCR Steelhead on February 16, 2000 (65 FR 7764) that encompassed the major Columbia River tributaries known to support the DPS, including the Deschutes, John Day, Klickitat, Umatilla, Walla Walla, and Yakima Rivers, as well as the Columbia River and estuary.

In late 2000, a lawsuit was filed challenging the NMFS February 2000 final designation of CH for ESUs/DPSs of Pacific salmon and steelhead listed under the ESA. A federal court ruled that the agency did not adequately consider the economic impacts of the CH designations. In April 2002, NMFS withdrew its 2000 CH designations.

Critical habitat for MCR Steelhead was designated again on September 2, 2005 (70 FR 52630). Designated CH includes the stream channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary high-water line (33 CFR 319.11). In areas where ordinary high-water line has not been defined, the lateral extent is defined by the bankfull elevation. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge which generally has a flood recurrence interval of 1 to 2 years on the annual flood series.

5.2.2 PRIMARY CONSTITUENT ELEMENTS

The physical or biological features of CH essential to the conservation of the species are known as primary constituent elements (PCEs). The PCEs of MCR Steelhead CH are those sites and habitat components that support one or more life stages, including:

(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;

(2) Freshwater rearing sites with:

(i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility;

(ii) Water quality and forage supporting juvenile development; and

(iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.

(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

5.2.3 STATUS OF MIDDLE COLUMBIA RIVER STEELHEAD CRITICAL HABITAT

Migratory habitat quality for MCR steelhead has been severely degraded by the development of the Federal Columbia River Power System. Depending on the their natal watershed, adults and out-migrating juvenile steelhead encounter between one and three mainstem Columbia River dams migrating to and from the ocean. Hydroelectric development has modified natural flow regimes resulting in higher water temperatures, changes in fish community structure, and increased travel time for migrating adults and juvenile salmonids. Physical features of dams such as turbines also kill migrating fish. The only substantial habitat blockages at present for this species are Pelton Dam on the Deschutes River and Condit Dam on the White Salmon River. However, minor blockages from smaller dams, impassable culverts, and irrigation dams occur throughout the region. Several dams in the John Day River basin previously blocked habitat, but they have since been modified with ladders; however, there is a possibility that local native stocks were extirpated before these ladders were built (NMFS 2004).

Water quality impairment that affects spawning, migration, and rearing is a problem in many areas of designated CH for the MCR Steelhead. Summer stream temperature is the primary water quality problem for this species, and many of the stream reaches proposed as CH are listed on the Clean Water Act (CWA) 303(d) list for water temperature. Many areas that were historically suitable rearing and spawning habitat are now unsuitable due to high summer stream temperatures. Elevated stream temperatures may form thermal barriers to juvenile migration within tributaries. Removal of riparian vegetation, alteration of natural stream morphology, and withdrawal of water for agricultural or municipal use all contribute to elevated stream temperatures. Contaminants such as insecticides and herbicides from agricultural run-off and heavy metals from mine waste are common in some areas of designated critical habitat for this species.

Low summer stream flow is also a common characteristic affecting spawning, rearing, and migration PCEs for this DPS. There is little or no late summer flow in sections of the lower Umatilla and Walla Walla Rivers. Withdrawal and storage of natural stream flow in spawning and rearing areas have altered hydrological cycles, causing a variety of adverse impacts to MCR Steelhead habitat. Increased summer stream temperatures, migration blockages, stranding of fish, and alteration of sediment transport processes can result from water withdrawal for irrigation or municipal use (NMFS 1996; Spence *et al.* 1996). In many river basins, the amount and quality of available rearing habitat has been reduced by water withdrawals. Many stream reaches are over-appropriated under state water law, with more allocated water rights than existing stream flow conditions can support.

Spawning and rearing salmonids, such as steelhead, require physically complex lotic habitats with pools, large woody debris, undercut banks, and substrates with low levels of fine sediments (Spence *et al.* 1996; Bjornn and Reiser 1991). Although these habitat conditions are still present in many wilderness, roadless, and undeveloped areas, recent subbasin assessments and plans (NWPCC 2004) indicate that habitat complexity has been greatly reduced in many areas of designated critical habitat. Channel and riparian alterations for agricultural purposes, transportation, mining, forestry and other development activities have affected spawning, rearing and migration PCEs by reducing overall habitat complexity, cover, food availability, and spawning and rearing quality and quantity.

Under section 303(d) of the Clean Water Act, the Oregon Department of Environmental Quality (ODEQ) identified many streams within the LJD, UJD, MFJD, and NFJD watersheds that are water quality limited for high temperatures, dissolved oxygen, or biological criteria. Additionally, the ODEQ identified total phosphates and fecal coliform as water quality limitations for many streams within the Lower Mainstem John Day River, and sediment for many NFJD streams (NMFS 2004).

Critical Habitat Analytical Review Teams (CHARTs) were convened by NMFS for each recovery domain (NMFS 2005). CHARTs were charged with analyzing the best available data for each listed species, to make findings regarding the presence of essential habitat features in each watershed, identify potential management actions that may affect those features, and determine the conservation value of each watershed within each species' range. The action area occurs within three 5th-field HUCs: Lower North Fork John Day, Cottonwood Creek – JDR, and Long Creek. All three have a high conservation value. Mid-Columbia CHART members noted that PCEs in these HUCs support unique genetic resources since there is minimal hatchery influence on these populations.

The John Day Subbasin Plan (NPCC 2005) included an Ecosystem and Diagnostic Treatment (EDT) analysis of habitat conditions for the 5th field HUCs located in the action area. The approach was to display the top quartile protection and/or restoration 5^{th} field HUCs and their important restoration attributes. Ten 5th field HUCs identified as important to North Fork John Day summer steelhead were evaluated and the top five were displayed. One 5th field HUC in the action area made the list. Cottonwood Creek made the list for restoration benefit ranking 1^{st} for restoration priority and moderate for existing habitat protection. The attributes for restoration were: fish screening, flow restoration, riparian habitat improvements, and upland improvements.

The Subbasin Plan also ranked 5th field HUCs by restoration priority for the North Fork John Day River. Of the ten 5_{th} field HUCs evaluated, one in the action area ranked as follows, with a lower number meaning a higher restoration priority:

Cottonwood Creek: 1

Strategies that ranked the highest for restoration are: protect existing habitat, passage, riparian habitat improvements, fish screening, and in-stream activities and flow restoration.

6 ENVIRONMENTAL BASELINE

As mentioned in earlier sections, the predominant land use activity in the action area is livestock grazing for which there have been MNF and BLM formal and informal ESA consultations. The past, present and anticipated impacts of future Federal livestock grazing which have undergone formal consultation have been taken into account in the following description of the environmental baseline.

6.1 NMFS MATRIX OF PATHWAYS AND INDICATORS

A NMFS process paper titled "Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale" (NMFS 1996) is used to describe the environmental baseline. It is commonly known as the NMFS Matrix of Pathways and Indicators, hereafter referenced as the "NMFS MPI." The NMFS MPI identifies indicators to analyze for the following pathways: 1) Water quality; 2) Habitat access; 3) Habitat elements; 4) Channel condition and dynamics; 5) Flow/hydrology; and, 6) Watershed condition. The condition of each indicator is described as either "Properly Functioning" (PF), "At Risk (AR)," or "Not Properly Functioning (NPF)" based upon specific numeric or qualitative criteria. Tables 12 present the current status of the environmental baseline for the North Fork John Day River sub-basin, which include the action area, utilizing the NMFS MPI. Table cells in bold print indicate the current status of each indicator. The habitat indicators in the NMFS matrix also correspond to the PCEs of designated CH. The relationship between NMFS MPI habitat indicators and PCEs of CH is discussed in Section 7.2 (Analysis of Effects to Designated Critical Habitat).

TABLE 15. STATUS OF ENVIRONMENTAL BASELINE FOR THE NORTH FORK JOHN DAY SUB-BASIN.[1]

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Water Quality	Temperature	50 – 57° F (max 7-day average)	57 – 61° F (spawning, max 7-day average) 57 – 64° F (migration and rearing, max 7-day average)	**> 61° F (spawning, max 7-day average)** **> 64° F (migration and rearing, max 7-day average)**
	Sediment	< 12% fines (<0.85mm) in gravel	**12 – 20% fines**	> 20% fines
	Chemical Contaminants or Nutrients	Low levels of chemical contamination from agricultural, industrial, and other sources; no excess nutrients; no CWA 303d designated reaches	**Moderate levels of chemical contamination from agricultural, industrial, and other sources; some excess nutrients; one CWA 303d designated reach**	High levels of chemical contamination from agricultural, industrial, and other sources; high levels of excess nutrients; more than one CWA 303d designated reach

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
Habitat Access	Physical Barriers	Any man-made barriers present in watershed allow upstream and downstream fish passage at all flows	Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at base/low flows	**Any man-made barriers present in watershed do not allow upstream and/or downstream fish passage at a range of flows**
Habitat Elements	Substrate	Dominant substrate is gravel or cobble (interstitial spaces clear), or embeddedness <20%	Gravel and cobble is subdominant, or if dominant, embeddedness 20 – 30%	**Bedrock, sand, silt, or small gravel dominant, or if gravel and cobble dominant, embeddedness >30%**
	Large Woody Debris	> 20 pieces/mile (> 12 inch diameter and > 35 ft. length), and adequate sources of woody debris recruitment in riparian areas	**Currently meets standards for Properly Functioning, but lacks potential sources from riparian areas of woody debris recruitment to maintain that standard**	Does not meet standards for Properly Functioning and lacks potential large woody debris recruitment
	Pool Frequency	Meets pool frequency standards and meets large woody debris recruitment standards for Properly Functioning habitat	Meets pool frequency standards but large woody debris recruitment inadequate to maintain pools over time	**Does not meet pool frequency standards**
	Pool Quality	Pools > 1 meter deep (holding pools) with good cover and cool water; minor reduction of pool volume by fine sediment	Few deeper pools (> 1 meter) present or inadequate cover/ temperature; moderate reduction of pool volume by fine sediment	**No deep pools (> 1 meter) and inadequate cover/temperature; major reduction of pool volume by fine sediment**
	Off Channel Habitat	Backwaters with cover, and low energy off-channel areas (ponds, oxbows, etc.)	**Some backwaters and high energy side channels**	Few or no backwaters; no off-channel ponds

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	Refugia	Habitat refugia exist and are adequately buffered (e.g., by intact riparian reserves); existing refugia are sufficient in size, number, and connectivity to maintain viable populations or subpopulations (all life stages and forms)	**Habitat refugia exist but are not adequately buffered (e.g., by intact riparian reserves); existing refugia are insufficient in size, number, and connectivity to maintain viable populations or subpopulations (all life stages and forms)**	Adequate habitat refugia do not exist
Channel Condition & Dynamics	Width/Depth Ratio	< 10	**10 – 12**	> 12
	Stream Bank Condition	> 80% of any stream reach has > 90% stability	**50 – 80% of any stream reach has > 90% stability**	< 50% of any stream reach has > 90% stability
	Floodplain Connectivity	Off-channel areas are frequently hydrologically linked to main channel; overbank flows occur and maintain wetland functions, riparian vegetation, and succession	**Reduced linkage of wetland, floodplains, and river areas to main channel; overbank flows are reduced relative to historic frequency, as evidenced by moderate degradation of wetland function and riparian vegetation/succession**	Severe reduction in hydrologic connectivity between off-channel, wetland, floodplain, and riparian areas; wetland extent drastically reduced, and riparian vegetation/success altered significantly
Flow/Hydrology	Change in Peak/Base Flows	Watershed hydrograph indicates peak flow, base flow, and flow timing characteristics comparable to an undisturbed watershed of similar size, geology, and geography	**Some evidence of altered peak flow, base flow, and/or flow timing relative to an undisturbed watershed of similar size, geology, and geography**	Pronounced changes in peak flow, base flow, and/or timing relative to an undisturbed watershed of similar size, geology, and geography
	Increase in Drainage Network	Zero or minimum increases in drainage network density due to roads	**Moderate increases in drainage network density due to roads (e.g., 5%)**	Significant increases in drainage network density due to roads (e.g., 20 – 25%)
Watershed Condition	Road Density & Location	< 2 mi/mi^2; no valley bottom roads	2 – 3 mi/mi^2; some valley bottom roads	**> 3 mi/mi^2; many valley bottom roads**

Pathway	Indicators	Properly Functioning	At Risk	Not Properly Functioning
	Disturbance History	< 15% ECA (entire watershed) with no concentration of disturbance in unstable or potentially unstable areas, and/or refugia, and/or riparian areas	**< 15% ECA (entire watershed) but disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian areas**	> 15% ECA (entire watershed) and disturbance concentrated in unstable or potentially unstable areas, and/or refugia, and/or riparian areas
	Riparian Management Areas	The riparian reserve system provides adequate shade, large woody debris recruitment, and habitat protection and connectivity in all subwatersheds, and buffers or includes known refugia for sensitive aquatic species (>80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition > 50%	**Moderate loss of connectivity or function (shade, LWD recruitment, etc.) of riparian reserve system, or incomplete protection of habitats and refugia for sensitive aquatic species (~ 70 – 80% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition 25 – 50% or better**	Riparian reserve system is fragmented, poorly connected, or provides inadequate protection of habitats and refugia for sensitive aquatic species (< 70% intact), and/or for grazing impacts; percent similarity of riparian vegetation to the potential natural community/ composition < 25%

[1]Bold text in table cells indicates current status of the indicator

The environmental baseline using the NMFS MPI ratings (Table 15) is based on scientific literature review, management documents and the professional judgment of MNF Forest and District fishery biologists, hydrologists, soil scientists and range conservationists. The MCR Steelhead Recovery Plan, the Malheur National Forest Roads Analysis Report, and the Forest water temperature monitoring program support the environmental baseline ratings. The rationale from the supporting documents and programs for these ratings are summarized in the following three sections: 6.1.1; 6.1.2; and 6.1.3.

Historic and current cattle grazing in the ESA action area likely play varying roles in the current environmental baseline ratings for these affected subbasins. In some situations the actual small streams and corresponding 6th field subwatersheds draining the ESA action area may be properly functioning or functioning at risk while the larger subbasins are not properly functioning. Grazing is one of multiple natural and human-caused watershed disturbances influencing environmental baseline ratings. In some circumstances in these subbasins the proposed action has causal mechanisms that affect fish habitat indicators analyzed in the environmental baseline ratings.

6.1.1 MIDDLE COLUMBIA RIVER STEELHEAD RECOVERY PLAN

The Middle Columbia River Steelhead Recovery Plan (NMFS 2009) describes habitat conditions for the NFJD River population and its tributaries. The recovery plan states several limiting factors for the North Fork John Day that include: degraded floodplain and channel structure (pools, connectivity, diversity); altered sediment routing; and water quality (temperature, toxic mine waste). Water temperature is the primary concern within the Cottonwood Creek and lower North Fork John Day. Low flows are also a problem in the lower elevation tributaries to the west including Cottonwood Creek. Wissmar et. al. (1994) noted that turbidity in Cottonwood Creek, a tributary to the North Fork John Day, is notoriously high after storm events. The resulting siltation of streambeds decreases aquatic invertebrate forage production and degrades spawning habitat. Boulder Creek, Camp Creek, and Fox Creek in the Donaldson allotment are all within the headwaters of Cottonwood Creek.

Livestock grazing, logging, road construction, beaver removal and fire suppression have contributed to altered flow regimes. Elevated stream temperatures are common to almost all streams in the Lower North Fork John Day. Historical mining has added to water temperature and chemical problems by removing riparian vegetation, simplifying stream channels and changing substrate composition and mine leaching from tailings (NMFS 2009). High water temperatures in tributaries and portions of the mainstem alter or block juvenile steelhead movements in the summer months.

There are additional sources of information to inform the condition of the environmental baseline at finer scales than the NFJD River populations. They include a MNF roads analysis report, water temperature monitoring information, PIBO EM results, Multiple Indicator Monitoring (MIM) (Burton et al. 2011) monitoring results at Designated Monitoring Areas (DMA) for specific pastures in the allotments, Proper Functioning Condition (PFC) assessments (Prichard et al. 1994), Region 6 Level II Stream Surveys (see Appendix J for stream survey results), and a September 15, 2011 site assessment of Boulder and Indian Creeks. The information provided by each of these sources is presented and interpreted below.

6.1.2 MALHEUR NATIONAL FOREST ROADS ANALYSIS REPORT

The MNF prepared an analysis of its road system in a document titled "Malheur National Forest Roads Analysis Report" (MNF 2004b). Among the issues analyzed was the risk of the existing road network to general watershed health at the scale of 6^{th} level hydrologic unit codes (HUC), commonly known as subwatersheds. A description and details of the analysis process are included in Appendix D of the report. Many scientific studies have documented the impacts of roads on to fish, fish habitat, and watershed function. Effects include habitat fragmentation from stream crossing structures that block migration, increases in peak flows from high road density, increased sedimentation and isolating streams from their floodplains (USDA FS 2001). The MNF used a Geographic Information System assessment to determine watershed risk. The following watershed risk rating elements were used:

- Total road density (roads in management levels 1-5)
- Road density (roads in management levels 1 and 2)

- Total road density within 200 feet of perennial and intermittent streams
- Density within 200 feet of perennial and intermittent streams (roads in management levels 1 and 2)
- Total road-stream crossing density (crossings/square mile)
- Geologic Sensitivity
- Soil Sensitivity

Ranges of values for each element were assigned a risk rating of low, moderate, high or extreme (Table 16). For example, for total road density, an “extreme” risk rating was for densities greater than five miles per square mile and a “low” rating was for densities less than one mile per square mile. To determine the overall subwatershed risk rating, the risk rating for each element was assigned a numeric value. They ranged from 1 for a rating of “low” to 4 for a rating of “extreme.” The individual element numeric scores were then added for a total score. Total scores exceeding 23 were given an overall watershed risk rating of “extreme,” scores in the 17-23 range were given a “high” rating, scores from 11-17 were given a “moderate” rating and scores less than 11 were given a rating of “low.”

TABLE 16. RANGES OF VALUES BY RISK CATEGORY FOR ELEMENTS USED IN THE WATERSHED RISK ANALYSIS.

Risk Element	Risk Category			
	Low	Moderate	High	Extreme
Total Road Density (miles/mile^2)	0 - 1	1 - 3	3 - 5	>5
Level 1-2 Road Density (miles/mile^2)	0 - 1	1 – 2.5	2.5 – 4	>4
Road Density w/in 200 feet of streams (miles/mile^2)	0 – 0.2	0.2 – 0.6	0.6 – 0.9	>0.9
Level 1-2 Road Density w/in 200 feet of streams (miles/mile^2)	0 – 0.2	0.2 – 0.5	0.5 – 0.8	>0.8

Risk Element	Risk Category			
	Low	Moderate	High	Extreme
Road Stream Crossing Density (#crossings/mile)	0 – 1.5	1.5 - 3	3 – 4.5	>4.5
Percent of Subwatershed with Sensitive Geology	1 - 20	20 – 50	50 – 100	Not applicable
Percent of Subwatershed with Sensitive Soils	1 - 20	20 – 50	50 – 100	Not applicable

The results for the seven 6th field HUCs represented in the Donaldson, Deer Creek and Indian Ridge allotments are shown in Table 17. Lower Fox, North Face Creeks, Basin Creek, and Upper Deer Creek all were given a "high" watershed risk rating, while the Middle Fox, Upper Long Creek and Upper Fox 6th field had a "moderate" watershed risk rating. The majority of individual risk ratings for the road density, road proximity within 200 feet, and road crossings elements were "high" or "extreme." This suggests that the legacy road system has negatively impacted riparian and aquatic environmental baseline conditions in these 6th field HUCs.

The NMFS MPI values for the Road Density and Location (RDL) indicator are <2, 2-3 miles/mile^2 and >3 miles/mile^2 for the PF, AR and NPF categories, respectively. The "high" and "extreme" risk ratings for both road density risk elements are equivalent to the NMFS MPI NPF category. Therefore, the Lower Fox, North Face Creeks, Upper Deer Creek, and Middle Fox 6th field HUCs are NPF for RDL. A road density risk ratings of "moderate" would be considered either PF or AR, since the road density elements' ranges for "moderate" (1-3, 1-2.5) encompass the NMFS MPI numeric ranges for the PF and AR categories. Upper Fox, Basin Creek, and Upper Long Creek 6th field HUCs would fall within the ratings of PF or AR according to the NMFS MPI numeric ratings.

While there are no other roads risk analysis elements that are directly comparable to NMFS MPI indicators, it is logical that the Road Stream Crossing Density (RSCD) watershed risk element would inform an analysis of the NMFS MPI Increase in Drainage Network (IDN) indicator. The "extreme" or "high" risk scores for the RSCD risk element for the Upper Deer Creek, and North Face Creeks 6th field HUCs support a NMFS MPI classification of NPF for the IDN indicator.

Road crossings at streams are the primary mechanism for rainfall runoff intercepted by roads to enter stream channels. Roads tend to concentrate runoff, resulting in higher peak flows than would occur without roads. Fine sediments from road surfaces also enter stream channels at road crossings, increasing turbidity, substrate embeddedness and substrate composition. The "extreme" or "high" risk ratings for the RSCD risk element for the North Face Creeks, Basin

Creek, Upper Long Creek and Upper Deer Creek 6th field HUCs would logically support classification of NPF for the Change in Peak/Base Flows, Sediment and Substrate NMFS MPI indicators.

The vast majority of road crossings at streams are culverts. Poorly designed culverts can be barriers to juvenile or adult fish passage. The RSCD risk scores do not incorporate fish passage barrier information, but high or extreme risk ratings imply a large number of culverts with potential fish passage problems. The MCR Steelhead Recovery Plan identified fish passage barriers as a limiting factor for the Cottonwood Creek MaSA within the North Fork John Day subbasin. The MNF has tallied road crossing structures that may have fish passage concerns. No culverts were identified with potential fish passage problems within the Donaldson, Deer Creek and Indian Ridge allotment pastures.

The two risk elements for road density within 200 feet of streams do not have a comparable NMFS MPI indicator. However, roads within floodplains have the potential to negatively affect the Off-channel Habitat and Floodplain Connectivity NMFS MPI indicators. Many FS roads are in the valley bottoms, in or adjacent to riparian areas, and affect the ability of a stream to meander laterally through its floodplain. There is no information to determine to what degree a distance of 200 feet includes the floodplains for the various streams associated with the road system in the six 6th field HUCs represented in the Donaldson, Deer Creek and Indian Ridge allotments. However, the “extreme” or “high” risk ratings for the two risk elements for all 6th field HUCs with the exception of Upper Fox, Basin Creek, and Upper Long Creek would tend to support a NMFS MPI classification of NPF for the two indicators.

TABLE 17. SUB-WATERSHED RISK RATINGS FOR SIXTH FIELD HYDROLOGIC UNITS IN THE DONALSON, DEER CREEK AND INDIAN RIDGE ALLOTMENTS (FROM MNF 2004B).

Watershed Risk Element	Hydrologic Unit Code Name and Number						
	Lower Fox 170702020905	North Face Creeks 170702020904	Upper Deer Creek 170702021001	Middle Fox 170702020903	Basin Creek170702 030404	Upper Long Creek170702 030402	Upper Fox 170702020901
Road Density Risk (ML[1] 1-5)	High	High	High	Moderate	High	Moderate	Moderate
Road Density Risk (ML 1-2)	Extreme	Extreme	High	High	Moderate	Moderate	Moderate
Road 200' Proximity Risk (ML 1-5)	High	Extreme	Extreme	High	High	Moderate	Moderate
Road 200' Proximity Risk (ML 1-2)	Extreme	Extreme	Extreme	High	Moderate	Moderate	Moderate
Road Crossings Risk	Moderate	Extreme	High	Low	Extreme	High	Low
Geologic Sensitivity	Low	Low	Low	Low	Low	Low	Low
Soil Erosion Sensitivity	Moderate	Low	Moderate	High	High	Moderate	Moderate

Watershed Risk Element	Hydrologic Unit Code Name and Number						
	Lower Fox 170702020905	North Face Creeks 170702020904	Upper Deer Creek 170702021001	Middle Fox 170702020903	Basin Creek170702 030404	Upper Long Creek170702 030402	Upper Fox 170702020901
Overall Watershed Risk	High	High	High	Moderate	High	Moderate	Moderate

[1]ML = Road Maintenance Level (see narrative below)

Road maintenance level (ML) designations are defined as:

Level 1. These are intermittent service roads during the time they are closed to motorized traffic. The closure period must exceed one year. Basic custodial maintenance is performed to keep damage to adjacent resources to an acceptable level. Emphasis is normally given to maintaining drainage facilities and runoff patterns. Planned road deterioration may occur at this level. Roads receiving level 1 maintenance may be of any type, class, or construction standard.

Level 2. Roads open for use by high clearance vehicles. Passenger car traffic is not a consideration. Traffic is normally minor.

Level 3. Roads open and maintained for travel by a prudent driver in a standard passenger car. User comfort and convenience are not considered priorities. Roads in this maintenance level are typically low speed, single lane with turnouts and spot surfacing. Some roads may be fully surfaced with either native or processed material.

Level 4. Roads that provide a moderate degree of user comfort and convenience at moderate travel speeds. Most roads are double lane and aggregate surfaced. However, some roads may be single lane. Some roads may be paved and/or dust abated.

Level 5. Roads that provide a high degree of user comfort and convenience. These roads are normally double lane, paved facilities. Some may be aggregate surfaced and dust abated.

6.1.3 MALHEUR NATIONAL FOREST WATER TEMPERATURE MONITORING

Appendix I presents water temperature monitoring information for West Fork Deer Creek in the Deer Creek Allotment 1993-1995 and Cottonwood Creek, Fox Creek upper gorge within the Donaldson Allotment (1997-2000) in Table I-1. The monitoring site was located in MCR Steelhead CH. The West Fork of Deer Creek and Upper Fox Gorge are not on the Oregon Department of Environmental Quality 303(d) list for water temperature. Cottonwood Creek is on the Oregon Department of Environmental Quality 303(d) list for water temperature. The mean yearly maximum of seven day rolling means of the daily maximum in degrees Fahrenheit (7 day mean max) for West Fork Deer Creek was 61.0 degrees, 75.2 degrees for Fox Creek, and 74.1 degrees for Cottonwood Creek. The mean number of days per year over 64 degrees F for West Fork Deer Creek, Fox Creek, and Cottonwood Creek was 0, 60, and 67 days, respectively.

For the Indian Ridge allotment, no data were available for Indian Creek.

In the table, data are evaluated using the following criteria: 1) State water quality standards; 2) Amendment 29 DFC; 3) PACFISH RMO; and, 4) NMFS MPI.

The state water quality standard of the seven-day mean maximum temperature of 64 degrees F for streams with anadromous fish passage and salmonid rearing use was *met* for the West Fork Deer Creek. The Amendment 29 DFC for seven-day mean maximum temperature of 64 degrees F *was met.*

The state water quality standard of the seven-day mean maximum temperature of 64 degrees F for streams with anadromous fish passage and salmonid rearing use was *not met* for Cottonwood Creek or Fox Creek. The Amendment 29 DFC for seven-day mean maximum temperature of 64 degrees F was *not met* for Cottonwood Creek and Fox Creek.

The PACFISH RMO has three criteria. There was insufficient data to determine if there has been no measurable increase in the seven day mean maximum (criterion 1). Criterion 2, seven-day mean maximum below 64 degrees F for migration and rearing habitat, *was met* for West Fork Deer Creek and *not met* for Cottonwood Creek and Fox Creek. Criterion 3, seven-day mean maximum below 60 degrees F for spawning habitat, *was not met.* The data supported a NMFS MPI rating of NPF (seven day mean maximum >61 degrees F for spawning habitat; >64 degrees F for migration and rearing habitat) for Cottonwood Creek and Fox Creek. The data also supported a NMFS MPI of PF for West Fork Deer Creek.

6.2 PIBO MONITORING

The PACFISH-INFISH Biological Opinion (PIBO) monitoring strategy is described in section 3.1.2.3. Monitoring consists of two components: effectiveness and implementation. No PIBO monitoring sites are located within the Donaldson, Deer Creek, or Indian Ridge allotments.

6.2.1 EFFECTIVENESS MONITORING

No effectiveness monitoring sites exist within the Donaldson, Deer Creek, and Indian Ridge allotments.

6.2.1.1 EVALUATION OF EXISTING CONDITIONS TO PIBO MANAGED AND REFERENCE MEANS

No PIBO sites exist within the Donaldson, Deer Creek, and Indian Ridge Allotments therefore a comparison between existing conditions and PIBO managed and reference means cannot be made.

6.2.2 IMPLEMENTATION MONITORING

No implementation monitoring sites exist within the Donaldson, Deer Creek, and Indian Ridge allotments.

6.2.3 PFC ASSESSMENTS

PFC ratings have not been conducted within the Donaldson, Deer Creek, and Indian Ridge Allotments.

6.2.4 SITE ASSESSMENT OF BOULDER AND INDIAN CREEKS

September 15, 2011 a field visit was conducted by MNF staff within the Donaldson Allotment (Boulder Creek – Glade pasture) and the Indian Ridge Allotment (Indian Creek-East pasture). A R6 stream survey was completed on this reach in 1993 and trout were found within the allotment (see Appendix J for stream survey results). A site survey of Indian Creek was conducted by

MNF staff on September 15, 2011. *Oncorhynchus mykiss* were observed in an approximately 0.1 mile reach of Indian Creek within the allotment and upstream of steelhead CH. The MCR Steelhead CH layer does not currently extend beyond the allotment boundary. As discussed in the Status of the Species section, steelhead trout are the anadromous life history form of *O. mykiss*, which are difficult to distinguish from the resident life history form of *O. mykiss* (rainbow trout). Where the two life history forms co-occur as is the case for the John Day Basin, and there are no barriers preventing upstream passage of steelhead as is the case for Indian Creek, presence of the anadromous life history form can be deduced. Upstream extent of fish distribution ended at two headcuts with an elevation drop of approximately 4-feet potentially creating a barrier to juvenile and adult steelhead movement upstream. No additional headcuts or natural barriers were found upstream of this site and LWD/spawning gravel are abundant as well as cold water spring inputs.

Boulder Creek within the Donaldson allotment was also visited during this time. A series of three stock ponds were found with two of the ponds being located within MCR steelhead CH. The stock pond earthen berms spanned the entire stream and most of the floodplain. The heights of the stock ponds were estimated to be 5-10ft. One dead *O. mykiss* approximately 7 inches long was observed in the uppermost pond during the visit. Evidence of recent maintenance ~3 years was apparent at all three stock ponds.

7 EFFECTS OF THE PROPOSED ACTION

The direct and indirect effects of implementing the action, including interrelated and interdependent actions, on the listed species and designated CH are evaluated in this section. In addition, the probability of directly affecting juveniles, spawning adults, and incubating embryos in redds, and migrating adult MCR steelhead will be assessed. The environmental impacts of implementing the project elements (PE) will be evaluated by use of NMFS MPI indicators to determine effects to ESA-listed MCR Steelhead and designated CH.

As described in this document, the proposed action is expected to allow previously degraded riparian areas/habitat indicators to continue recovery. However, it is anticipated that the proposed grazing activities in all cases will maintain the current environmental baseline condition for each indicator. In some cases indicators are rated as Not Properly Functioning, which suggests that the proposed grazing activities will be maintaining this risk rating. However, because the environmental baseline rating is determined at the subbasin scale, the proposed grazing activities tend to influence only portions of subbasins, and watershed restoration activities needed to improve the baseline indicators at the subbasin scale will not likely occur over the life of this consultation, it is anticipated that the proposed grazing activities will maintain the current environmental baseline condition. Historic and current cattle grazing in the ESA action area likely plays varying roles in the current environmental baseline ratings for these affected subbasins.

7.1 PROJECT ELEMENT AND INTERRELATED ACTION EVALUATION

The component parts of the action are listed in Section 4.1.3 as six project elements and are also shown below.

1. Livestock use of allotment/pastures
2. Permittee management of livestock and infrastructure maintenance
3. Range improvements
4. Exclusionary fences
5. Monitoring
6. Adaptive management

We determined that unauthorized use (trespass) is not an action. However, the implementation of FS enforcement actions regarding unauthorized use is an interrelated action.

7.1.1 PROJECT ELEMENTS DROPPED FROM FURTHER ANALYSIS

An initial step in the analysis process is to determine if any of the project elements are already provided ESA coverage in a concluded programmatic consultation. The consultation history section (Section 1.1) described the Blue Mountain Expedited Section 7 Consultation (BMESSC) programmatic consultation, which includes coverage of range improvements described as: "e.g. fencing, off-site water developments." The consultation history section also described the Aquatic and Riparian Restoration Programmatic Consultation (ARRPC). Riparian exclusion fencing with water gaps and stream crossings is a category covered under the ARRPC biological opinion. Consequently, PEs 3 and 4 below already have existing ESA coverage and will not be further evaluated in this BA.

7.1.2 PROJECT ELEMENTS AND INTERRELATED ACTIONS WITH ENTIRELY BENEFICIAL EFFECTS

PE 6, adaptive management, provides a mechanism to adjust management if end-point indicators and desired conditions are not being met. Examples of adaptive management measures include reducing livestock numbers, changing the timing and duration of grazing, adjusting the numeric end-point indicators and constructing more exclusion fences. Making adjustments to ensure that end-point indicators and desired conditions are met will result in positive effects to habitat indicators and therefore to CH. The results would also have beneficial effects to the species, as many adaptive management adjustments will reduce the time that livestock are in or adjacent to streams.

Law enforcement actions to remove cattle not under permit will result in entirely beneficial effects to the species and designated CH.

7.1.3 PROJECT ELEMENTS REMAINING FOR ANALYSIS

Of the six PEs initially developed for this livestock grazing consultation, PEs 3 and 4 have been addressed as already covered by existing programmatic consultations still in effect, and the effect of implementing PE 6 has been determined to be entirely beneficial to CH and to the species. The set of PEs remaining for analysis are:

1. Livestock use of allotment/pastures
2. Permittee management of livestock and infrastructure maintenance
5. Monitoring

7.1.3.1 PE1: LIVESTOCK USE OF ALLOTMENT/PASTURES

Livestock will graze the allotment and individual pastures in the numbers, time frames and locations described in the proposed action section and in the term grazing permit.

7.1.3.2 PE2: PERMITTEE MANAGEMENT OF LIVESTOCK AND INFRASTRUCTURE MAINTENANCE

This PE includes the move-in and move-out of livestock using highway and off-road vehicles, herding by range riders, and maintenance of existing stock ponds within MCR steelhead CH streams. While vehicles are also used to access sites for monitoring purposes (PE 5), the effects of vehicle use to CH and to the species will only be assessed for this PE to reduce redundancy in the analysis. Side-boards for vehicle use are provided by the PDCs described earlier in the proposed action section.

Several hundred troughs, springs and stock ponds are maintained by grazing permittees to provide on and off stream water for livestock. In addition, there are miles of fence and dozens of gates that are maintained each year. Typical maintenance activities involve the use of hand tools or machines on a small footprint of land. Some work such as repairing troughs or replacing wire will not involve any soil or vegetation disturbance. Other maintenance activities may disturb soil and vegetation and alter stream hydrology such as excavating stock ponds and maintaining earthen dams within the stream channel. Workers performing maintenance activities may walk in riparian areas or in stream channels where listed fish are present or in designated CH in order to complete pond maintenance that is within the stream channel.

7.1.3.3 PE5: MONITORING

A variety of implementation and effectiveness monitoring techniques are employed to determine if desired conditions are being met. The MNF Riparian Monitoring Strategy is discussed in detail in the Monitoring section (Section 4.1.4). Workers use manual and electronic equipment to measure vegetation, water quality and stream channel/streambed characteristics. Some monitoring actions include wading in stream channels.

7.2 ANALYSIS OF EFFECTS TO DESIGNATED CRITICAL HABITAT

The three PEs will be analyzed first for their effects to designated CH, then for effects to the species. The freshwater primary constituent elements (PCE) of MCR Steelhead CH applicable to the action area are presented in Table 18.

TABLE 18. PRIMARY CONSTITUENT ELEMENTS OF MCR STEELHEAD CRITICAL HABITAT APPLICABLE TO THE ACTION AREA.

PCE	Description
1	Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.

2	Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3	Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

The effects to each PCE, and ultimately to designated CH as a whole, can be determined by evaluating the effects to indicators of the NMFS MPI that correspond to each PCE. The MNF uses a crosswalk table format for this purpose. Table 19 presents the analysis for effects of the action to the PCEs of MCR Steelhead designated CH. Table 20 presents a summary of effects to the indicators associated with each PCE of MCR Steelhead CH. Measurable effects to several habitat indicators of PCEs were concluded.

Table 19. Analysis of Effects to MPI Indicators Corresponding to PCEs of Designated Critical Habitat for MCR Steelhead within the Donaldson, Deer Creek and Indian Ridge Allotment

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
(1) Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development;	Water Quantity	Flow/ Hydrology	Changes in Peak/Base Flows	Riparian vegetation has been linked to the water-holding capacity of streamside aquifers (Platts 1991). As riparian vegetation is removed by grazing and streamside soils are compacted by hooves, the ability of areas to retain water is decreased. Decreased evapotranspiration and infiltration increase and hasten surface runoff, resulting in a more rapid hydrologic response of streams to rainfall. When this occurs, high flows in the spring tend to increase in volume, leading to bank damage and erosion, and channel downcutting. Summer and fall base flows are decreased, often resulting in flows that are insufficient to provide suitable rearing habitat for juvenile salmonids. If aquifers lose their capacity to hold and slowly deliver water to the stream, differences between peak and base discharge rates increase dramatically (EPA 1993). Some streams that typically flowed perennially may experience periods of no flow in the summer or fall. Li *et al*. (1994) found that flow in a heavily grazed eastern Oregon stream became intermittent during the summer, while a nearby, well-vegetated reference stream in a similar-sized watershed had permanent flows. They suggested that the difference in flow regimes was due to diminished interaction between the stream and floodplain with resultant lowering of the water table. Indirect effects of historic livestock grazing in the ESA action area (including trailing and watering), on channel and bank features such as bank stability, undercut banks and width to depth ratio, as well as impacts to shrub recruitment and green line plant vigor, have likely affected peak and base flows on some streams. It is anticipated that PE 1 (livestock use) will have negative effects to this indicator, but they will be too small to be meaningfully measured**,** particularly to flows at the time of year when spawning, incubation and larval development occur. The use of BMPs, end point indicators, and adaptive management should minimize effects. If hydrophytic vegetation, bank stability, width-depth ratio, and undercut banks show a static and/or downward trend and the Forest is not meeting RMOs, grazing practices will be modified (See Adaptive Management Section VI). PE 2 (permittee mgt. and mtce.) includes off-road vehicle use and maintenance of existing stock ponds. Off road vehicle use has the potential to increase soil compaction, but it will be minimized by use of PDCs. Maintenance activities for instream stock ponds likely results in altered hydrology including a reduction of peak and base instream flows. PE 2 overall will have a **negative** and **meaningfully measurable** effect to the indicator by reducing spring peak stream flows and summer low

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				flows within MCR steelhead CH within the Donaldson allotment (Boulder Creek) and have a neutral effect within the Deer Creek and Indian Ridge allotments. PE5 (monitoring) will not increase compaction or remove vegetation, and therefore does not have a mechanism to affect peak/base flow. The effect to the indicator is neutral.
			Increase in Drainage Network	None of the PEs has road construction, so no change to the drainage network will occur. The proposed action would have a neutral effect on the indicator.
	Water Quality	Flow/ Hydrology	Temperature	The temperature monitoring data for the Cottonwood Creek and Fox Creek monitoring sites did not meet State of Oregon water quality standards, Amendment 29 DFCs, or PACFISH RMOs, and rated NPF using the NMFS MPI criteria (see Section 6.1.3). The West Fork of Deer Creek did meet State of Oregon water quality standards, Amendment 29 DFCs, or PACFISH RMOs, and rated PF using the NMFS MPI criteria (see Section 6.1.3). Many grass/grass-like species found on the MNF have an ungrazed potential height of 2 to 3 feet (MNF 2007). In meadow streams with narrow channels, they often are the plants that provide stream shade. PE 1 (livestock use) will potentially reduce vegetation heights to 4 or 6 inches. This will considerably reduce stream shade in those circumstances compared to the ungrazed potential vegetation heights (see discussion that follows in Effects to Listed Species section). Livestock use (PE 1) is likely to result in measurable water temperature increases for certain stream reaches. These impacts are expected to be generally confined to low gradient stream channels less than 10 feet wide with grass/grass-like vegetation providing shade. The effect to this indicator by livestock use is **negative** and **meaningfully measured**. It should be noted that water temperatures typically are below concern thresholds when spawning, incubation and larval development of MCR Steelhead occurs, as flows are greater than later in the year. PE 2 (permittee livestock management and infrastructure maintenance) permitee maintenance of existing ponds within the Donaldson allotment (Boulder Creek) will likely facilitate continual alteration of channel forming processes and warming of water temperatures within MCR steelhead CH that will be **negative** and **meaningfully measurable** and have a neutral effect within the Deer Creek and Indian Ridge allotments. PE 5 (monitoring) activities will not

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				remove vegetation that provides shade nor affect channel-forming processes that might widen stream channels. Consequently, there is no mechanism for PE 3 to affect water temperature and the effect of the PE for the indicator is neutral. Livestock grazing on federal land in the ESA action area is managed to attain the endpoint indicators, which were developed to meet PACFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, W/D ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives, and thereby maintain water temperatures. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize adverse impacts to this element of the PCE.
			Sediment/ Turbidity	Livestock use (PE 1), as well as use by wild ungulates, results in trampled and grazed riparian vegetation, and altered stream banks to some degree. Livestock also use trails to access streams for water. Livestock occasionally will concentrate their use in certain areas, potentially creating patches of relatively bare soil. Some of these areas may be adjacent to stream sections used by MCR Steelhead for spawning, incubation and larval development. Bare soil is prone to erosion and can result in fine sediment entering stream channels and resultant increases in turbidity. Habitat impacts are likely to include areas of exposed streambank up to a few feet wide where livestock access streams to drink or cross, and areas of bank disturbance where livestock graze in riparian areas. Exposed areas and other bank disturbances that occur are likely to result in a slight increase in turbidity for a short distance downstream during rainstorms or runoff events. However, given background levels of turbidity during runoff events it will be difficult to distinguish between turbidity resulting from these grazing impacts and background turbidity. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is also likely to occur. Endpoint indicators were developed in order to meet PACFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet our Riparian

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				Objectives. If monitoring fails to show this trend, adaptive management would be implemented (Section 4.1.5) and endpoint indicators would be modified to minimize adverse effects to critical habitat. However, livestock grazing will increase the amount of sediment entering streams by the mechanisms described above. These impacts are expected to be localized and short-term. Consequently, the effect to this indicator by PE1 (livestock use) is **negative** and expected to be **measurable**. PE 2 involves use of vehicles on and off roads, as well as infrastructure maintenance. There is the potential for fine sediment to be transported from unpaved roads to stream channels, primarily at road crossings, and at stock ponds located within the stream channel in the Donaldson allotment (Boulder Creek) during rainstorms or runoff events. However, it is impossible to determine the proportion of the suspended sediment attributable to road use or pond maintenance by permittees, given the use of the roads for other purposes and the timing of when maintenance occurs on the ponds. In addition, background levels of suspended sediment in streams will be high during rainstorms and runoff events, and the contribution by permittee use of roads and pond maintenance to increased turbidity cannot be meaningfully measured. Use of off-road vehicles should not result in measurable effects due to use of PDCs. Range riding with horses will not cause any meaningfully measured increases in streambed sediment or turbidity. Maintenance activities for ponds within the Donaldson allotment (Boulder Creek) will likely disturb soil, and alter hydrology within the stream channels through damming of instream flow and catchment of sediment. Overall, the effects of PE 2 to the indicator are negative and not meaningfully measured in the Donaldson Allotment (Boulder Creek) and neutral effect within the Deer Creek and Indian Ridge allotments. Monitoring (PE 3) activities such as pebble counts and measuring cross-sections involve wading in stream channels. Other monitoring activities involve walking or riding horses in riparian areas. The timing of these activities is typically after spawning, incubation and larval development of MCR Steelhead, although there may be some overlap in timing. Spawning surveys also involve wading. Wading may result in very small increases in turbidity downstream for a short distance (a few feet) that will quickly dissipate. Walking and riding

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
				horses in riparian areas should not result in fine sediment delivery to stream channels. However, there may be very small and transient increases in turbidity when a stream is being crossed. The monitoring PE effect to the indicator is negative, but not meaningfully measured.
			Chemical Contamination/ Nutrients	Urine and dung from livestock use (PE 1) in riparian areas increases the likelihood that nitrogen and phosphorous will enter streams. Increased nutrients will likely increase stream productivity at the source of nutrients and for a short distance downstream. It is anticipated that livestock grazing will have slight negative impacts to the indicator, but they are not expected to be meaningfully measured. PE 2 (permittee management and infrastructure maintenance) includes vehicle use and stock pond maintenance. The risk of chemical contamination to streams will be minimized by use of PDC. Maintenance activities are typically distant from designated CH, and at locations not hydrologically connected to stream channels. However stock pond maintenance may involve the use of heavy equipment for dredging and therefore there is a likelihood for introduction of petroleum products into the stream channel. Use of horses for range riding will have similar effects (but much smaller scale) than that of PE 1, above. Maintenance activities are typically distant from stream channels with the exception of stock pond maintenance. The overall effect of PE 2 is for slight negative effects to the indicator that are not expected to be meaningfully measureable for the Donaldson Allotment (Boulder Creek) and the Deer Creek and Indian Ridge allotments. Monitoring (PE 5) does not involve the use of chemicals and does not have the potential to affect nutrients in streams. PE 5 will have a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Suitable Substrate	Habitat Elements	Substrate Embeddedness	The analysis of effects to the sediment/turbidity indicator, above, determined that use of riparian areas by livestock is expected to increase the amount of sediment entering streams. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is likely to occur. There is the potential for fine sediment to slightly increase embeddedness within gravels suitable for spawning when the gravel is located immediately downstream from exposed and disturbed streambank areas such as stock ponds. The effect to this indicator by livestock use (PE 1) is **negative** and **meaningfully measurable**. The analysis for sediment/turbidity determined that PE 2 would have a negative, but not meaningfully measured effect to the indicator resulting in sediment input and compaction from maintenance of the ponds within the stream channel. Therefore, the same conclusion is made for the substrate embeddedness indicator. As described above, monitoring (PE 5) would not introduce fine sediment into stream channels. The monitoring PE will have a neutral effect to the indicator.
(2) Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical	Water Quantity	Flow/ Hydrology	Changes in Peak/Base Flows	See discussion above.
			Increase in Drainage Network	See discussion above.
	Water Quality	Water Quality	Temperature	See discussion above. The rearing period includes the summer months when elevated water temperatures are most concerning for juvenile salmonids, and the sun's position in the sky results in the greatest potential for increased solar radiation to streams. It is this time period when the small, but measurable increases to water temperature would take place.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks			Sediment/ Turbidity	See discussion above.
			Chemical Contamination/ Nutrients	See discussion above. The conclusion was for a slight negative effect to the indicator from livestock use (PE 1) and permittee management and infrastructure maintenance (PE 2) since there would be an increase in nutrients into streams. However, the introduction of nutrients may lead to small increases in stream productivity.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Flood-plain Connect-ivity	Channel Condition and Dynamics	Floodplain Connectivity	Channel entrenchment is the main concern for loss of floodplain connectivity. Indirect effects of livestock use (PE 1), including trailing and watering, on things such as bank stability, undercut banks, width depth ratio, shrub recruitment, and green line plant vigor have limited some streams' ability to access their flood plains, thus concentrating energies within confined channels and causing additional erosion. Many of these streams are still experiencing this phenomenon. Channel entrenchment as a result of livestock use (PE 1) will be prevented by use of endpoint indicators to meet PACFISH grazing standards and guidelines as well as water quality BMPs. The conclusion is that the effect to the indicator by livestock use is negative but not meaningfully measured. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize negative effects to floodplain connectivity. PE 2 (permittee livestock management and infrastructure maintenance) includes on and off road vehicle use. Road use has no mechanism to affect floodplain connectivity. PDC for off-road use will prevent channel downcutting. Range riding with horses will occasionally cross a stream but effects to streambanks and beds will be so minimal as to not affect the indicator. Infrastructure maintenance actions related to stock ponds within MCR steelhead CH in the Donaldson Allotment (Boulder Creek) would have a negative and meaningfully measurable affect immediately below stock ponds as a result of altered/reduced peak and low flow and diminished flooding capabilities of the stream floodplain. The overall effect of PE 2 is a neutral affect to the indicator for the Deer Creek and Indian Ridge allotments. Monitoring (PE 5) does not remove riparian vegetation or otherwise have mechanisms to destabilize stream channels. PE 5 will have a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Width/Depth Ratio	Three stream surveys reported bankfull width-depth ratios ranging from 5.9 to 36.7, with 3 of 4 stream reaches that had R6 stream surveys completed meeting the NMFS MPI criterion for PF (<10) (see Appendix J for stream survey monitoring data). It should be noted that besides riparian vegetation, the stream attributes most directly affected by grazing activities are bank stability, bank angle, width to depth ratio, and percent undercut banks. Bankfull width-to-depth ratios in the Donaldson, Deer Creek and Indian Ridge allotments are potentially in balance with the landscape setting, however a large portion of MCR steelhead habitat within the allotments had no existing R6 stream surveys including some of the most heavily impacted from grazing. Streams that may not be functioning properly are potentially more susceptible to degradation. This is somewhat concerning given that both Bengeyfield (2006) and Rosgen (1996) have indicated that the relationship between a stream's width and depth is perhaps the most revealing of all stream channel indicators as to whether the stream is in a condition to perform the various tasks that lead to a healthy riparian area. This indicator, along with appropriate riparian vegetation, is critically important for a stream to maintain its dimension, pattern, and profile even during moderate to high (10-25+ year return intervals) flow events, like those that occurred in 2011. Livestock use (PE 1) is anticipated to have a negative, but not meaningfully measured effect to the indicator. The potential for increases in width-depth ratio is less than in the past because of implementation of endpoint indicators for livestock grazing (which includes use by wild ungulates) and adaptive management. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use and stock pond maintenance. Road use has no mechanism to affect W/D ratio. PDC for off-road use will prevent bank damage and effects to W/D ratio. Range riding with horses will occasionally cross a stream but effects to streambanks and beds will be so minimal as to not affect the indicator. Infrastructure maintenance actions (excluding stock pond maintenance within stream channels) do not affect streambanks or riparian vegetation adjacent to CH, and will therefore not affect W/D ratio. Maintenance of stock ponds will continue to have a **negative** and **meaningfully measurable** impact within the Donaldson allotment (Boulder Creek) due to a reduction in stream flow immediately below the ponds during base flows resulting in a loss of hydric vegetation which maintains streambanks and channel width/depth. The effects of the altered hydrology from the stock ponds coupled with livestock grazing and loss of hydric vegetation would result in channel incision and eventually widening. The overall effect of PE 2 is a **negative** and **meaningfully measurable** to the indicator within the Donaldson allotment (Boulder Creek) and neutral effect within the Deer Creek and Indian Ridge allotments. PE 5 (monitoring) does not remove vegetation or destabilize stream banks. There is no potential for it to increase W/D ratio. The monitoring PE will have a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Forage	Habitat Elements	Substrate Embeddedness	See discussion above for this indicator for the suitable substrate PCE habitat feature. The conclusion for livestock use (PE 1) was that a slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is likely to occur. This would result in small areas of increased embeddedness. Increased embeddedness may result in a decrease in the potential for production of aquatic macroinvertebrates (a forage item for rearing salmonids) in small, isolated patches. The conclusion is that PE 1 will have a slight negative effect on substrate embeddedness with respect to the production of forage. Consistent with the analysis for the suitable substrate PCE habitat feature, the effect of PCE 2 to the indicator is negative but not meaningfully measured, and the effect of PCE 5 is neutral.
			Large Woody Debris	Livestock grazing does not affect this indicator in conifer-dominated riparian forests. Livestock use can negatively affect this indicator when grazing occurs within hardwood stands such as aspen, alder, birch, and cottonwoods that could contribute larger pieces of wood to small streams. In sites in the action area that would be naturally dominated by cottonwood gallery riparian forests, livestock use (PE 1) will likely result in altering the level of cottonwood stocking and future large tree (and subsequent large woody debris) recruitment (Kaufmann et al. 1983, Case and Kaufmann 1997, Beschta and Ripple 2005). Therefore it is anticipated that livestock will graze young cottonwoods at levels meaningfully measured with respect to the future production of large woody debris. The effect to this indicator by livestock use (PE 1) is **negative** and **meaningfully measured**. Using BMPs, end point indicators, and adaptive management will result in discouraging browse on existing hardwoods and willows but may not promote regeneration of new cottonwoods. PE 2 (permittee management and infrastructure maintenance) maintenance and continual operation of stock ponds within the stream channel would have a **negative** and **meaningfully measurable** impact on riparian hardwoods by altering stream flow regimes and the residence time of water within the Donaldson allotment (Boulder Creek) and a neutral effect within the Deer Creek and Indian Ridge allotments. PE 5 does not affect trees and associated LWD in any way. Therefore there is no mechanism for an effect and the effect is neutral to the indicator for both PEs.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Frequency	All available data from stream survey reaches within the allotments indicate that pool frequencies are not currently meeting the DFC as described within Amendment 29 of the MNF LRMP and would be considered to be NPF using NMFS MPI criteria. See Appendix J for stream survey results. Indirect effects of livestock grazing (including trailing and watering), on bank stability, undercut banks, width-depth ratio, shrub recruitment, green line plant composition and vigor have the potential to affect this indicator. The use of BMP's for livestock management, end point indicators and adaptive management, should result in an overall effect by PE 1 (livestock use) to pool frequency that is not meaningfully measured and unlikely to occur. PE 2 (permittee management and infrastructure maintenance) includes on and off road vehicle use and stock pond maintenance. Road use has no mechanism to affect pool frequency. PDC for off-road use will prevent bank damage and effects to pool frequency. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions can affect streambanks or riparian vegetation adjacent to CH, and pool frequency by altering flow regime and dissipating stream energy that would otherwise be used to create pools within the stream channel within the Donaldson allotment (Boulder Creek) that are expected to be **negative** and **meaningfully measurable**. The overall effect of PE 2 is neutral within the Deer Creek and Indian Ridge allotments. PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool frequency. The monitoring PE has a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Quality	Residual pool depth is generally low with no pools greater than 1 meter deep in surveyed stream reaches. See Appendix J for stream survey results. Based upon stream survey data, pool quality would be considered to be NPF using NMFS MPI criteria. Indirect effects of livestock grazing (including trailing and watering), on bank stability, undercut banks, width-depth ratio, shrub recruitment, green line plant composition and vigor have the potential to affect this indicator. The use of BMP's for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management, should result in an overall effect by PE 1 (livestock use) to pool quality that is negative and not meaningfully measured. PE 2 (permittee management of livestock and infrastructure maintenance) includes on and off road vehicle use and stock pond maintenance . Road use has no mechanism to affect pool quality. PDCs for off-road use will prevent bank damage and effects to pool quality. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions involving instream stock ponds affects streambanks and riparian vegetation within steelhead CH, and pool frequency by altering flow regime and dissipating stream energy that would otherwise be used to create quality pools within the stream channel. The overall effect of PE 2 is a **negative** affect to the indicator with a **meaningfully measurable** effect only occurring within the Donaldson allotment and neutral effect within the Deer Creek and Indian Ridge allotments. PE 5 (monitoring) does not have any mechanisms to affect plants or bank and channel features that would impact pool quality. The monitoring PE has a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Off-Channel Habitat	There is very little off-channel habitat within tributaries of the NFJD River. Of the 4 stream surveys that reported data on percent of side channels within reaches, values ranged from 0.1 to 4 percent. The use of BMP's for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management, should result in an overall effect by PE 1 (livestock use) to off-channel habitat that is negative and not meaningfully measured. PE 2 (permittee management of livestock and infrastructure maintenance) includes on and off road vehicle use and instream stock pond maintenance. Road use has no mechanism to affect pool frequency. PDC for off-road use will prevent bank damage and effects to off-channel habitat. Range riding with horses will occasionally cross a stream but effects to streambanks will be so minimal as to not affect the indicator. Infrastructure maintenance actions involving instream stock ponds affects off-channel habitat within steelhead CH by altering flow regime, dissipating stream energy, and catchment of instream flow that would otherwise create and water off channel habitat. The overall effect of PE 2 is a **negative** and **meaningfully measurable** affect to the indicator within the Doanldson allotment (Boulder Creek) and a neutral effect within the Deer Creek and Indian Ridge allotments. PE 5 (monitoring) does not have any mechanisms to affect off-channel habitat. The monitoring PE has a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Refugia	The availability of refugia is a limiting factor identified in the recovery plan for the Oregon steelhead population of the MCR Steelhead distinct population segment (NMFS 2009). The NMFS MPI (NMFS 1996) defines the Refugia indicator as: "important remnant habitat for sensitive aquatic species." All of the habitat indicators in this crosswalk table are potential components of Refugia. Analysis for previous indicators has determined that PE 1 (livestock use) will have **negative** and **meaningfully measured** effects to several of them. This may occur in areas that meet the definition of Refugia. Therefore, PE 1 (livestock use) will have negative and meaningfully measured or evaluated effects to the Refugia indicator. The availability of refugia is a limiting factor identified in the recovery plan for the Oregon steelhead population of the MCR Steelhead distinct population segment (NMFS 2009). The NMFS MPI (NMFS 1996) defines the Refugia indicator as: "important remnant habitat for sensitive aquatic species." All of the habitat indicators in this crosswalk table are potential components of Refugia. Analysis for previous indicators has determined that PE 2 stock pond maintenance will have negative and meaningfully measured effects to several of them within the Donaldson allotment (Boulder Creek). Analysis of the indicators for PE2 within the Deer Creek and Indian Ridge allotment are not expected to have a meaningfiul and measurable affect.This may occur in areas that meet the definition of Refugia. Therefore, PE 2 (infrastructure maintenance) will have **negative** and **meaningfully measured** or evaluated effects to the Refugia indicator within the Donaldson allotment and a neutral effect within the Deer Creek and Indian Ridge allotments. The highest level of effect to previous indicators by PE 5 (monitoring) was "negative but not meaningfully measurable" for small and transient increases in turbidity by wading in stream channels or crossing streams on foot or by horse. This level of effects will not impact the function of Refugia to provide important remnant habitat. Therefore, the effect conclusion is neutral for the monitoring PE.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
		Watershed Condition	Riparian Reserves	As described above, PE 1 (livestock use) will result in negative effects within riparian areas to indicators. A negative effect to Riparian Management Areas (RMA) (east-side analog of Riparian Reserves) is indicated. However, the negative effects should not rise to the level that impacts to the processes and functions of RMAs are meaningfully measurable. Endpoint indicators were developed with seral class in mind to meet PACFISH grazing standards and guidelines, enclosure B of the LMRP and water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this trend, adaptive management would be implemented and endpoint indicators would be modified to minimize adverse effects to Riparian Reserves. Therefore the determination of effects to the Riparian Reserves indicator for PE 1 is **negative but not meaningfully measurable**. The highest level of effect to previous indicators by PE 2 (permittee management and infrastructure maintenance) for stock pond maintenance was “negative and meaningfully measurable.” This level of effects will impact the processes and functions of RMAs and not facilitate movement towards desired conditions or Riparian Objectives within the Donaldson allotment and Boulder Creek. Therefore, the effect conclusion is **negative** and **meaningfully measurable** for PE 2 within the Donaldson allotment (Boulder Creek) and neutral effect within the Deer Creek and Indian Ridge allotments. The monitoring PE does not have any mechanisms to affect the processes and functions of RMAs. The monitoring PE has a neutral effect to the indicator.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
	Natural Cover	Habitat Elements	Substrate	This indicator focuses on the composition of streambed substrate, with embeddedness considered as a secondary factor. Stream survey data indicates that 3 of 4 stream reaches within the allotments have substrate that is dominated by gravel or cobble and less than 20 percent embedded (PF using NMFS MPI criteria). The remaining reach would be classified as AR or NPF. See Substrate Embeddedness indicator above, and Appendix J for stream survey results. Based on the stream survey data the Substrate indicator would be classified as “AR” using NMFS MPI criteria. The analysis of effects to the sediment/turbidity indicator for PCE 1, above, determined that use of riparian areas by livestock is expected to increase the amount of sediment entering streams. A slight increase in fine sediment deposition for a short distance downstream of exposed and disturbed areas is likely to occur. However, this is not expected to measurably change the composition of existing substrate with regard to its function as cover for juvenile or adult MCRS Steelhead. Therefore, the effect to this indicator by PE 1 (livestock use) is negative and not meaningfully measurable. The use of BMP’s for livestock management, end point indicators (which are inclusive of wild ungulate use), and adaptive management, should further minimize the magnitude of potential negative effects by PE 1. The analysis of effects to the sediment/turbidity indicator for PCE 1, above, determined that the effect of PE 2 (permittee management and infrastructure maintenance) was “negative and not meaningfully measured.” This level of effects is not expect to measurably change the composition of existing substrate with regard to its function as cover for juvenile or adult MCRS Steelhead. Therefore, the effect to this indicator by PE 2 (maintenance) is negative and not meaningfully measurable. As described above, PE 5 (monitoring) would not introduce fine sediment into stream channels. The monitoring PE will have a neutral effect to the indicator.
			Large Woody Debris	See Above.

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
			Pool Frequency	See Above.
			Pool Quality	See Above
			Off-Channel Habitat	See Above
			Refugia	See Above
		Watershed Condition	Riparian Reserves	See Above

PCE	PCE Habitat Feature	Matrix Pathway	Matrix Indicator	Rationale
(3) Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival;	Migration Corridors Free of Obstruct-ion	Habitat Access	Physical Barriers	No barriers will be created or removed by PE 1 (livestock use) or PE 5 (monitoring); these PEs will have a neutral effect on the physical barriers indicator. (PE2) Maintenance of instream stock ponds which act as a migration barrier for MCR steelhead will have a **negative** and **meaningfully** measurable effect on the physical barrier indicator within the Donaldson allotment (Boulder Creek) and neutral effect within the Deer Creek and Indian Ridge allotments.

TABLE 20. SUMMARY OF EFFECTS OF THE PROPOSED ACTION BY THE PROJECT ELEMENTS OF LIVESTOCK GRAZING IN THE DONALDSON, DEER CREEK AND INDIAN RIDGE ALLOTMENT TO THE INDICATORS ASSOCIATED WITH HABITAT FEATURES OF EACH PRIMARY CONSTITUENT ELEMENT OF MCR STEELHEAD CRITICAL HABITAT.

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element		
			PE1: Livestock Use	**PE2: Permittee Management of Livestock and Infrastructure Maintenance**	**PE 5: Monitoring**
1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development	Water quantity	Changes in Peak/Base Flows	NNMM[1]	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Increase in Drainage Network	Neutral	Neutral	Neutral
	Water quality	Temperature	***NMM***[2]	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Sediment/Turbidity	***NMM***	NNMM	NNMM
		Chemical Contamination/Nutrients	NNMM	NNMM	Neutral
	Suitable substrate	Substrate Embeddedness	***NMM***	NNMM	Neutral
2. Freshwater rearing sites with: (i) Water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; (ii) Water quality and forage supporting juvenile	Flow/hydrology	Changes in Peak/Base Flows	NMM	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge))	Neutral
		Increase in Drainage Network	Neutral	Neutral	Neutral
	Water quality	Temperature	***NMM***	**NMM Boulder Creek (Donaldson)**	Neutral

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
development; and (iii) Natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks				Neutral (Deer Creek) (Indian Ridge)	
		Sediment/Turbidity	***NMM***	NNMM	NNMM
		Chemical Contamination/Nutrients	NNMM	NNMM	Neutral
	Floodplain connectivity	Floodplain Connectivity	NNMM	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Width/Depth Ratio	NNMM	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
	Forage	Substrate Embeddedness	***NMM***	NNMM	Neutral
		Large Woody Debris	***NMM***	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Pool Frequency	NNMM	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Pool Quality	NNMM	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian	Neutral

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element		
			PE1: Livestock Use	PE2: Permittee Management of Livestock and Infrastructure Maintenance	PE 5: Monitoring
				Ridge)	
		Off-Channel Habitat	NNMM	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Refugia	***NMM***	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Riparian Reserves	NNMM	Neutral	Neutral
	Natural cover	Substrate	NNMM	NNMM	Neutral
		Large Woody Debris	***NMM***	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Pool Frequency	NNMM	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Pool Quality	NNMM	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Off-Channel Habitat	NNMM	**NMM Boulder Creek**	Neutral

Primary Constituent Element	PCE Habitat Feature	Indicator	Effect Conclusion by Project Element		
			PE1: Livestock Use	**PE2: Permittee Management of Livestock and Infrastructure Maintenance**	**PE 5: Monitoring**
				(Donaldson) Neutral (Deer Creek) (Indian Ridge)	
		Refugia	***NMM***	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
		Riparian Reserves	NNMM	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral
3. Freshwater migration corridors free of obstruction and excessive predation with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival	Migration corridors free of obstruction	Physical Barriers	Neutral	**NMM Boulder Creek (Donaldson)** Neutral (Deer Creek) (Indian Ridge)	Neutral

[1]NNMM = Negative, not meaningfully measured

[2]***NMM*** = Negative, meaningfully measured

7.3 ANALYSIS OF EFFECTS TO LISTED SPECIES

7.3.1 GENERAL EFFECTS

Effects to MCR Steelhead from livestock grazing can be in the form of direct impacts to individual fish or indirectly through habitat disturbance. Direct disturbance includes trampling on MCR Steelhead redds, resulting in injury or death to incubating embryos or alevin; disturbing holding or spawning adults, forcing them to alter their behavior and seek cover; or disturbing rearing juveniles, forcing them to alter their behavior and seek cover; entrapment of adult and juvenile steelhead within stock ponds; physical migration barriers for adult and juvenile steelhead in the form of earthen dams.

Grazing can have a number of detrimental effects on riparian and aquatic habitat (Belsky et al. 1999). When riparian habitat is negatively affected, the survival and growth of listed fish species may also be negatively affected. For example, if temperatures increase to critical levels due to reduced shade, salmonid survival can decrease and some habitat may be abandoned as fish migrate to seek cooler temperatures. Loss of overhead cover in the form of overhanging vegetation or undercut banks is likely to result in increased predation of juvenile salmonids.

Maintenance of stock ponds within fishbearing stream channels can have a number of detrimental effects to riparian and aquatic habitat, and aquatic species. Effects include altered hydrology and the resultant effects to stream channel processes, adult and juvenile fish passage barriers, juvenile rearing mortality, juvenile fish entrapment, and other effects described in detail below.

Altered hydrology also alters the frequency of bankfull flows that maintain and form natural channel and fish habitat within a stream (pool frequency, quality pools, riparian vegetation, side channel habitat and refugia). Altered hydrology can also decrease the “vigor” of hydric plants within a riparian area by decreasing the duration of available soil moisture, affecting bank stability and stream shading in the form of riparian hardwoods. Increases in fine sediment are likely to increase turbidity that can alter salmonid behavior, and is also likely to increase fine sediment in spawning gravels that decreases egg-to-fry survival. In the event of stock pond failure during high flows, a large pulse of fine sediment delivered to the downstream channel is likely to occur.

However, the livestock grazing end-point indicators were developed to meet PACFISH grazing standards and guidelines, enclosure B of the LMRP and water quality BMPs. The assumption is that meeting the endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. This will allow recovery of degraded riparian habitat to occur. Recovery of riparian vegetation results in the development of more complex habitat. Riparian recovery allows roots to stabilize streambanks, and stems and foliage to slow water velocities, trap fine sediment, provide overhead cover for fish, provide shade that may aid in keeping stream temperatures cool, and provide surfaces for macroinvertebrates to inhabit. Stable stream banks and fine sediment trapping result in less fine sediment in spawning substrate that would improve egg-to-fry survival (Bjornn and Reiser 1991). Reduced water velocities along stream edges increase the amount of available habitat for young salmonids (Bjornn and Reiser 1991). Spawning salmonids appear to prefer spawning in areas in close proximity of overhead cover

(Bjorn and Reiser 1991), and overhead cover protects juvenile salmonids from predation. Shade provided by vegetation can be important in keeping stream temperatures cool for salmonids. Li *et al.* (1994) found that trout abundance decreased as solar input and water temperature increased. Macroinvertebrates inhabiting overhanging vegetation provide forage for juvenile MCR Steelhead when they fall into the stream. Each of these benefits contributes to increasing the amount and quality of habitat available for all freshwater life stages of MCR Steelhead.

7.3.2 DIRECT EFFECTS TO SPECIES

The Donaldson and Deer Creek allotments contain MCR Steelhead spawning and rearing habitat. The Indian Ridge allotment does not include MCR steelhead critical habitat; however a field visit to the upstream extent of CH resulted in observation of *Oncorhynchus mykiss* being observed approximately 0.1 miles onto Forest Service lands and into the Indian Ridge allotment. At certain times and under various conditions it is possible for livestock use (PE 1) to directly impact listed MCR Steelhead. These effects could manifest themselves as direct impacts to individual fish, fry, or incubating embryos.

Direct impacts are likely to occur if livestock wade into a stream and disturb rearing juveniles or spawning adults, and/or step on redds. Juveniles in close proximity to stream crossings or watering sites are likely to move out of an area when livestock enter or approach the stream. Juveniles are likely to be at increased risk of predation. Livestock will have access to spawning CH in the Donaldson and Deer Creek Allotments during the spawning period. Livestock will also have access to spawning habitat upstream of steelhead CH in the Indian Ridge Allotment. It is likely that spawning behavior could be interrupted, forcing adults to retreat to nearby cover, and that redds will be at risk of being stepped on. However, these risks will be minimized with the implementation of the *Malheur National Forest Strategy to Minimize Redd Trampling "Take" of Steelhead and Bull Trout* (Appendix F). Additionally, MNF staff (range and aquatic specialists) will take extra effort to monitor these sites when they are in the field. If active redds are located, mitigation actions will be taken to eliminate or significantly minimize the potential for redd trampling (PDC 5 and 6).

The potential for direct impacts from PE 2 (permittee management of livestock and infrastructure maintenance) is smaller with the exception of maintenance of instream stock ponds in MCR steelhead CH. Road use has no potential for direct impacts to the species. The PDCs do not allow off-road vehicles to cross streams except for use of existing fords on road crossings. Range riders on horses will occasionally cross streams, but redds will be identified and avoided, and any disturbance to adults or juveniles should be sufficiently brief to not result in significant disruption of normal behavioral patterns. Infrastructure maintenance actions that are located in stream channels, such as stock ponds (Donaldson allotment-Boulder Creek) have the potential for direct impacts by preventing upstream passage of migrating adult MCR steelhead and downstream out- migration of juvenile MCR steelhead and contributing additional sediment to the stream channel. Ponds also have the potential for entrapment of both adult and juvenile steelhead in Boulder Creek.

Dissolved oxygen (DO) is highly correlated with stream temperatures. Stock ponds located within the stream channel can effectively lower DO levels to lethal levels for MCR steelhead especially when no escapement from the stock pond exists and entrapment occurs during peak flows followed by return to base flows. Some monitoring activities (PE 5) involve walking in stream channels. Actions such as pebble counts and redd surveys will result in individuals walking across stream channels for time periods that may result in MCRS steelhead being disturbed and moving out of the area, resulting in direct impacts to the species.

7.3.3 DIRECT AND INDIRECT EFFECTS TO AQUATIC AND RIPARIAN HABITAT

Use of the NMFS MPI to determine effects to listed fish species is based upon using the effects of the action on habitat indicators as a surrogate for effects to the species. The premise is that the indicators and the range of environmental baseline conditions provided by the three classifications (PF, AR, NPF) depict the biological requirements of the listed fish species. Since there is a direct relationship between habitat condition and the growth and survival of individual fish at various life stages, the effects of the action on habitat variables can be linked to effects to individuals of the species, and ultimately to an ESA effect determination.

The analysis in the “Effects to Critical Habitat” section (Section 7.2) evaluated specific NMFS MPI indicators that correspond to the PCEs of CH. The PCEs are used to describe “those physical or biological features that are essential to the conservation of the listed species.” The same sub-set of NMFS MPI indicators evaluated for effects to PCEs also apply to the analysis of effects to the species. To eliminate redundancy, only those indicator/PE combinations for which a conclusion of effect to a component of a PCE was “negative and meaningfully measured” will be brought forward for further evaluation in this section, as they have the potential to adversely affect listed MCR Steelhead. The conclusion was found for PE 1 (livestock use) and PE 2 (permittee management and infrastructure maintenance) only for the Donaldson allotment and not for PE 5 (monitoring). The indicators for which “negative and meaningfully measured” effects were concluded are:

PE1 (Livestock grazing)

- Water Temperature
- Sediment/Turbidity
- Substrate embeddedness
- Refugia
- Large woody debris

PE2 (permittee management of livestock and infrastructure maintenance)-Donaldson Allotment (Boulder Creek)

- Changes in Peak/Base Flows
- Temperature
- Floodplain Connectivity
- Width/Depth Ratio
- Large Woody Debris
- Pool Frequency
- Pool Quality
- Off-Channel Habitat
- Refugia
- Physical Barriers

7.3.3.1 EFFECTS ON WATER TEMPERATURE

Water temperature is an important factor affecting distribution and abundance of salmonids within the action area. Water temperatures influence water chemistry, as well as every phase of salmonid life history. Optimal temperatures for steelhead are 50˚ to 61˚ F (10˚ to 16˚ C), and the lethal temperature is approximately 77˚ F (25˚ C). Stream temperatures are of particular concern within the John Day Subbasin. This is highlighted in the John Day Subbasin Plan (NPCC 2005) as well as the MCR Steelhead recovery plan (NMFS 2009). Degraded water quality, which includes elevated water temperatures, is identified as a Limiting Factor in both plans.

Temperature monitoring information for MNF lands within the allotments is limited to one site in the Deer Creek Allotment (1993, 1995) and two sites within the Donaldson Allotment (1997, 1999, 2000). The West Fork of Deer Creek is within the Deer Creek allotment. Fox Creek and Cottonwood Creek are within the Donaldson allotment. The monitoring sites are located in MCR Steelhead CH. The West Fork of Deer Creek is not on the Oregon Department of Environmental Quality 303(d) list for water temperature nor is Fox Creek within the Donaldson allotment, however Cottonwood Creek within the Donaldson Allotment is on the 303(d) list for water temperature; both streams contain MCR Steelhead CH. Analysis of the temperature monitoring information at the site determined that it did not meet the State of Oregon water quality standard, Amendment 29 DFCs, or PACFISH RMOs, and rated NPF under NMFS MPI criteria (see Section 6.1.3). Within the action area, high stream temperatures occur near the end of July or the beginning of August and coincide with low stream flows and warm daytime temperatures. By the end of August, stream temperatures are typically dropping. No temperature monitoring sites were located on Boulder Creek within the Donaldson allotment which contains MCR steelhead CH and has two stock ponds located within CH. No monitoring sites were located on Indian Creek because the CH habitat layer only extended to the Forest Boundary, however fish distribution was found to extend past the Forest Boundary for approximately 200 ft before a headcut approximately 4-5ft high was found.

Stream temperature is driven by the interaction of site conditions, weather, riparian vegetation, and the input of radiant energy to a stream system. Energy exchange that affects a change in water temperature may involve solar radiation, long wave radiation, evaporative heat transfer, convective heat transfer, conduction, and advection (Lee 1980; Beschta and Weatherred 1984) (Figure 6). Solar radiation is the most important source of radiant energy affecting stream temperature (Brown 1969; Beschta 1997). With the exception of solar radiation that only delivers heat energy, all the other processes are capable of both introducing and removing heat from a stream. While the process of introducing and removing heat from a stream is complex, certain processes are more important than others in determining how stream temperature is affected by solar inputs (Beschta et al. 1987). In terms of water temperature increases, the principle source of heat energy is solar radiation directly striking the stream (Brown 1972) (Figure 6)

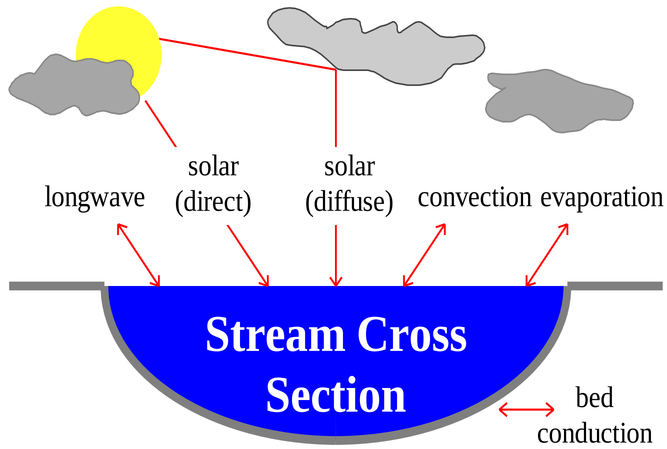

FIGURE 6. HEAT EXCHANGE BETWEEN A STREAM AND ITS ENVIRONMENT.

Canopy density and height are the dominant factors in the ability of streamside vegetation to intercept incoming solar radiation and reduce the rate of warming. Decline in the abundance and vigor of riparian plants in a floodplain may also cause streams to become shallow and wide, which increases the surface area that is exposed to solar radiation. Platts (1981) cited studies by Claire and Storch (1977) and others that found that removal of streamside vegetation contributed to increases in water temperatures in small headwater streams as well as influencing suspended sediment concentrations. Small streams (especially Rosgen C and E channels) are more susceptible to warming because they have a lower volume of water to absorb solar energy. They are also more susceptible to warming because grazing impacts herbaceous vegetation and shrubs that typically provide shade to the stream channel.

Effective shade is the total solar radiation blocked from reaching the stream over a twenty-four hour period, expressed as a percentage of the total solar radiation:

$$\text{Effective Shade} = \frac{\text{Total Solar Radiation - Total Solar Radiation Reaching the Stream}}{\text{Total Solar Radiation}}$$

Effective shade is provided by features such as topography and vegetation (ODEQ 2010b). Effective shade is influenced by slope steepness, vegetation species composition, tree height, vegetation density, tree distance from the stream bank, and stream width. Thus, although riparian vegetation is a physical barrier between the stream and incoming solar radiation, only a portion of the riparian canopy contributes to effective shade. The relationship of variables influencing effective shade can be simplified, to some degree, using geometry and computer models that simulate shade (Boyd 1996, Park 1993).

Figure 7 and Table 21 illustrate the relationship between shade and stream channel width. As stream channel width increases beyond the point where vegetation is not tall enough to cast a shadow across the stream channel, shade values decrease. The model analysis results in Table 21 are based on the shadow cast by vegetation at a distance of 1 foot and farther from the edge of the channel.

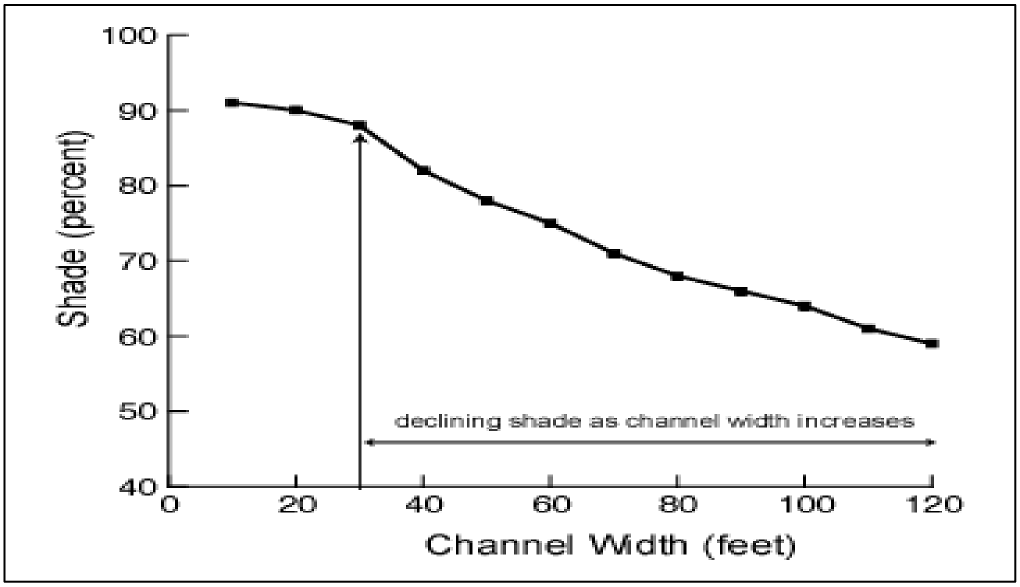

FIGURE 7. SHADE PROVIDED BY 150-FOOT TALL CONIFERS (PLATTS ET AL 1987), (PARK, 1993).

TABLE 21. EFFECTIVE SHADE PROVIDED BY THREE HEIGHTS OF GREENLINE VEGETATION AT VARYING ACTIVE STREAM CHANNEL WIDTHS.[1]

Active Channel Width (feet)	Percent Effective Shade at Varying Vegetation Heights		
	0.5 feet	2 feet	3 feet
1	0	46	57
3	0	22	41
7	0	9	18
10	0	7	12
12	0	5	10
14	0	5	9
16	0	4	8
18	0	4	7
20	0	3	6
22	0	0	3
24	0	0	1

26	0	0	0

[1]Effective shade values are based on the shadow cast by continuous vegetation growing at a distance of 1 foot and farther from the edge of the channel

Figure 7, Table 21 and the discussion above illustrate that decreasing vegetation height will reduce effective shade, and as a result increase solar radiation to the surface of the water in the stream. If the potential height of ungrazed vegetation is in the two to three feet range, then a considerable loss of effective shade takes place when the vegetation is grazed to an end-point of 0.5 feet (six inches) or less. The potential for stream warming is greatly increased, particularly for streams with narrow active channel widths.

Ungrazed height for 13 grass or grass-like plant species in the MNF ranged from 14 to 36 inches, with a mean of 26 inches (MNF 2007). The vegetation heights in Table 21 of two and three feet encompass the approximate mean ungrazed height and maximum ungrazed height of the 13 species. An end-point of 6 inch (0.5 feet) stubble height is used when livestock are grazed, which also reflects use by wild ungulates. In meadow streams with narrow channels, grass/grass-like species often are the plants that provide stream shade. Model results presented in Table 21 indicate that managing to a six-inch vegetation height will reduce effective shade to zero for channel widths that are 1 foot and greater when the model criterion is for vegetation beginning at 1 foot distance from the active channel, and to no more than 18 percent if modeled for vegetation at the edge of the active channel. This is considerably less than effective shade provided by potential vegetation heights of two to three feet for similar active channel widths.

A conservative conclusion is that implementation of PE 1 (livestock use) will reduce effective shade for a bank distance sufficient to result in a measurable water temperature increase. These impacts are expected to be generally confined to narrow stream channels with grass/grass-like vegetation providing shade.

Platts (1991) states that grasses are too short to keep much solar radiation from reaching the water, except along very small streams (stream orders 1 and 2). Wright and Li (2002) measured wetted widths in late July and early August 1996-1998 for five 1st and 2nd order streams in the MFJD River drainage. These are likely to have similar dimensions to streams of the same orders in the UMJD River drainage. The mean wetted width was 2.0 meters with a standard error of 0.5 meter (6.6 feet with a standard error of 1.6 feet). There is 90% confidence that the true mean wetted width is within 6.6 +/- 3.4 feet (3.2 to 10.0 feet). The greatest probability of measurable temperature increases as a result of livestock grazing is therefore likely to occur in channels less than 10 feet wide.

Figure 7 and Table 21 also indicate that effective shade is reduced as channel width increases. Grazing by large hooved animals has the potential to increase channel width by bank alteration (Armour et al. 1991; Clary and Webster 1989; Kaufman and Kruger 1984).

The continual maintenance of stock ponds or extension of an earthen berm in height and length within a stream channel can facilitate warming of water temperatures thru solar radiation. Stock ponds provide a large surface with a relatively shallow depth and volume. Multiple ponds within a system can magnify these effects in downstream reaches of streams. The amount of solar radiation absorbed, and degree to which temperatures increase is proportional to surface area and volume. The larger a body of water (volume) is the longer it retains that heat and the slower it cools down from solar radiation. Ground water inputs and shade may mediate these impacts but in the case of Boulder Creek within the Donaldson allotment riparian hydric species are rare or absent along with large shade trees. Very few springs exist within the allotment and are located further upstream within the headwaters of Boulder Creek therefore groundwater cooling after solar heating within these stock ponds is highly unlikely. Width/depth ratios can also alter stream temperatures by accelerating solar radiation and increasing the duration to cool back down once heated up. Shading after heating is often insufficient to cool a stream down to its original temperature. Often miles of complete shade are required to cool a stream down just a few degrees once it is warmed by solar radiation. Stock ponds can alter hydrology which impacts riparian and hydric species by decreasing the duration of available soil moisture, affecting bank stability, greenline composition, channel morphology, and stream shading.

Dissolved oxygen (DO) concentrations within the water are highly correlated with stream temperature stock ponds that capture all flow lower DO and could result in lethal levels for MCR steelhead entrapped within the stock ponds.

However, the analysis presented for effects to width-depth ratio in Table 19 for the Floodplain Connectivity habitat feature of PCE 2 (rearing critical habitat) concluded that the livestock use PE is anticipated to have a negative, but not meaningfully measured effect to the indicator. The potential for increases in width-depth ratio is less than in the past because of implementation of endpoint indicators for livestock grazing (which includes all use by wild ungulates) and adaptive management. However, these endpoint indicators do not address stock ponds located entirely within the stream channel and floodplain. Effective shade will not be measurably reduced as a result of effects to the width-to-depth ratio indicator.

The PE2 (Permittee management of livestock and infrastructure maintenance) was found to have a negative and meaningfully measurable effect to Temperatures within the Donaldson Allotment (Boulder Creek).

Conclusion. The discussion above described negative effects to habitat and vegetation characteristics from the livestock use PE1 and stock pond maintenance PE2 (Donaldson allotment-Boulder Creek). Effects to these characteristics result in negative impacts to water temperature. It is probable that livestock use will result in small, but measurable increases in water temperature in streams with narrow channels (<10 feet) where grass/grass-like vegetation is providing stream shade for PE1. This will occur as a result of reducing the height of shade-producing vegetation by grazing. It is also probable that stock ponds located within MCR steelhead CH on Boulder Creek in the Donaldson allotment will result in large temperature increases due to increased solar radiation exposure to surface areas and longer residence times of water within the ponds.

These effects to water temperature will be minimized by use of endpoint indicators and PDC. As described earlier, if pre-season monitoring indicates that wild ungulate use is resulting in measurements near or exceeding an endpoint indicator, cattle will not be turned-out into that specific pasture. These indicators were developed to meet PACFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this upward trend, adaptive management and administrative actions would be implemented to continue to minimize adverse effects to CH and the listed MCR Steelhead. It should be noted some impacts from past management activities (e.g., logging, roads, grazing) will persist over the life of this consultation and likely much longer in some cases.

7.3.3.2 EFFECTS ON SEDIMENT/TURBIDITY, SUBSTRATE AND SUBSTRATE EMBEDDEDNESS

Grazing by large herbivores can result in hoof shear to streambanks, and trampling and consumption of streamside vegetation. The result is a potential increase in the supply of fine sediment available for transport. This can occur when grazing results in compacted soils and bare areas; and when grazing results in decreased bank stability through mechanical damage to streambanks or reductions in rooting strength of streambank stabilizing vegetation. Both result in an increase in erosion rates and subsequent increases in fine sediment levels in streams.

Small amounts of fine sediment are likely to enter streams where livestock access streams to cross or water. Small amounts of fine sediment are likely to become deposited in substrate that can decrease egg-to-fry survival and slightly reduce available substrate cover for juveniles and macro-invertebrates.

Increased fine sediment is detrimental to MCR Steelhead through increased turbidity and sediment deposition in the substrate. Increases in fine sediment lead to greater substrate embeddedness and a decrease in the interstitial spaces between gravel substrate important for salmonid spawning. Successful salmonid spawning requires clean gravels with low fine sediment content (Spence et al. 1996). Well-oxygenated water must be able to reach eggs and pre-emergent fry during incubation and emergence. Suffocation of these life stages may occur if redds become covered with fine sediment. Emerging fry may be physically blocked from escaping a redd. Increased sediment load is also detrimental to juvenile salmon by introducing suspended particulate matter that interferes with feeding and territorial behavior (Berg and Northcote 1985). Increased fine sediment deposition in the substrate is likely to decrease MCR Steelhead egg-to-fry survival (Spence et al. 1996).

In addition, inputs of fine sediment resulting from livestock trampling banks can reduce benthic invertebrate abundance and lead to a shift from aquatic insects to mollusks, which are less palatable to salmonids. Studies have shown that sediment inputs resulting in substrate embeddedness of greater than one-third can result in a decrease in benthic invertebrate abundance and thus a decrease in food available for juvenile salmonids (Waters 1995).

There are no streams in the proposed action area that have been identified on the 303(d) list for sedimentation. Fine sediment levels vary across the allotments. Amendment 29 of the LMRP sets a desired condition of <20% embedded. The most current stream survey data available reported that all of reaches that have had embeddedness analyzed within the allotments have substrate embeddedness greater than 20% (See Appendix J for Stream Survey results).

Conclusion. The livestock use PE1 will result in sediment entering stream channels. The mechanisms include: 1) mechanical bank damage from hoof chisel and trampling; 2) trailing; and, 3) impacts to soil-holding vegetation by being eaten and trampled. These mechanisms negatively impact bank stability, resulting in increased erosion. The increases in fine sediment will negatively and measurably affect the Sediment/Turbidity and Substrate Embeddedness

NMFS MPI indicators. Continual maintenance of stock ponds within the Donaldson allotment is expected to not have a meaningfully measurable negative effect.

These effects to the Sediment/Turbidity and Substrate Embeddedness indicators will be minimized by use of endpoint indicators and PDC. If pre-season monitoring indicates that wild ungulate use is resulting in measurements near or exceeding an endpoint indicator, cattle will not be turned-out into that specific pasture. These indicators were developed to meet PACFISH grazing standards and guidelines as well as water quality BMPs. The assumption is that meeting these endpoint indicators would move key riparian and stream channel elements (bank stability, w/d ratio, woody species regeneration) towards their Desired Conditions and meet Riparian Objectives. If monitoring fails to show this upward trend, adaptive management and administrative actions would be implemented to continue to minimize adverse effects to designated CH and the listed MCR Steelhead. It should be noted some impacts from past management activities (logging, roads, grazing) will persist over the life of this consultation and likely much longer in some cases.

7.3.3.3 EFFECTS ON REFUGIA

The concept of “Refugia” is not described in detail in the NMFS MPI (NMFS 1996) (see Table 15 earlier in this document). The definition provided therein is: “important remnant habitat for sensitive aquatic species.” The availability of various types of habitat refugia are described as limiting factors in the recovery plan for the Oregon steelhead populations of the MCR Steelhead DPS (e.g., loss of side-channels that provided high flow refugia; cold water refugia provided by Columbia River tributary streams such as the Deschutes River (NMFS 2009).

The analysis of effects to PCEs of CH provided in Table 19, and summarized in Table 20, indicate that the livestock use PE will have negative and meaningfully measured effects to several of the MPI indicators that correlate to components of PCEs. Specifically, they are “Water Temperature,” “Sediment/Turbidity,” and “Substrate Embeddedness.” This may occur in stream reaches providing refugia conditions for one or more of these habitat characteristics (areas with cooler water temperatures, low levels of sediment in substrate or the water column, and low levels of substrate embeddedness). Therefore, PE 1 will have a negative effect to the Refugia indicator.

Generally, permittee managment and infrastructure maintenance has no effect or a negative but not meaningfully measurable effect on refugia. However the maintenance of stock ponds spanning the entire floodplain within MCR steelhead CH will have negative and meaningfully measured effects to several of the MPI indicators that correlate to components of PCEs that include water temperature, pool frequency, pool quality, large woody debris, floodplain connectivity, and off channel habitat. All of these MPI indicators provide some degree of refugia to both adult and juvenile steelhead.

Conclusion. The livestock use PE and permittee livestock management and infrastructure maintenance PE for the Donaldson allotment will result in negative and meaningfully measured impacts to several habitat indicators associated with refugia. Consequently, there will be negative and meaningfully measured, evaluated or detected impacts to the refugia indicator. The effects are not expected to be distributed evenly across the ESA action area because stream reaches providing characteristics of refugia are not ubiquitous. Negative impacts to the Refugia indicator will be minimized by use of the endpoint indicators and PDC.

7.3.3.4 EFFECTS ON LARGE WOODY DEBRIS

Large woody debris (aka large wood) is one of the most important habitat components in many fish-bearing streams (Gurnell et al. 2002). Large wood helps provide cover, scour pools, stabilize banks, retain spawning gravels, create off-channel habitats, and provide habitat for macroinvertebrate production (Gregory et al. 2003).

In streams within the action area, large wood is usually provided by fallen conifers that have no effect from the project elements. However, in some areas where hardwoods—particularly black cottonwood and quaking aspen—play an important role in riparian species composition, ungulate grazing can prevent future large wood recruitment by limiting sapling regeneration and large tree recruitment. Young cottonwoods are desirable forage to both domestic and wild ungulates (Braatne et al. 1996).

Kaufmann et al. (1983) found late season riparian cattle grazing retarded regeneration of black cottonwood saplings in northeastern Oregon. Another study found when cattle were removed from a riparian pastures, but wild ungulates were not exclosed, the number of black cottonwood seedlings/saplings increased 56% 3 years after livestock removal (Case and Kaufmann 1997). Clearly, cattle grazing can influence the abundance of black cottonwoods in a riparian area, which can have measurable and foreseeable future effects to riparian structure and future large wood recruitment. Beschta and Ripple (2005) surveyed a 40-mile reach of the Middle Fork John Day River nearby the action area for cottonwood abundance and stand structure and found very little cottonwood seedling/sapling regeneration or recruitment into large trees and described wild and domestic ungulate browsing as the primary causal factor.

Stock ponds located within the Donaldson allotment (Boulder Creek) alter hydrology. Riparian vegetation composition is often inextricably linked to peak and base flows. Cottonwood regeneration is dependent on high “scouring” flows and the majority of hydric riparian species require at least some degree of flow. Loss of cottonwood regeneration prevents future large wood recruitment. Cottonwood galleries and associated riparian species are often linked to bank stability, stream shading, and several fish habitat forming indicators. Upland mesic species do not have the root masses capable of withstanding high flow events nor the complexity and diversity often associated with “wet” riparian areas. Stock ponds within the Donaldson allotment (Boulder Creek) also have the potential for reducing primary production by capturing allocthonous material that would otherwise be transported downstream. This directly effects macroinvertebrate production and riparian vegetation “vigor” and composition. Juvenile salmonids are dependent on aquatic macroinvertebrates for forage as well as terrestrial insects that are dependent on riparian hardwoods.

The analysis of effects to PCEs of CH provided in Table 19, and summarized in Table 20, indicate that the livestock use and permitee livestock management and infrastructure maintenance PEs will have negative and meaningfully measured effects to the “Large Woody Debris” MPI indicator that correlates to components of PCEs. Therefore, PE 1 and PE 2 will have a negative effect to the large woody debris indicator.

Conclusion. The livestock use and permittee livestock management and infrastructure maintenance PEs will likely result in negative effects to future large woody debris recruitment. The effects will likely be observed in areas where adequate cattle forage overlaps low-gradient stream sections such as MSRAs that have relatively open canopy and have potential to develop a cottonwood gallery forest or within streams that have stock ponds that alter hydrology of the system. The mechanisms include: 1) browsing on young cottonwoods seedings/saplings, 2) retarding cottonwood succession and large tree recruitment; and, 3) reduction in future levels of instream large wood. These mechanisms will negatively and measurably affect the large woody debris NMFS MPI indicators. Negative impacts to the large woody debris indicator from livestock use will be minimized by use of the endpoint indicators and PDC.

7.3.3.5 EFFECTS TO INDICATORS RELATED EXCLUSIVELY TO PE2

Because of the unique situation on Boulder Creek within the Donaldson Allotment the analysis of effects for PE2 within MCR steelhead CH is discussed separately. The following discussion of affects is related specifically to PE2 (permittee livestock management and infrastructure maintenance) within the Donaldson allotment (Boulder Creek). A series of pre-existing stock ponds were authorized for maintenance in 2009 within MCR steelhead CH on Boulder Creek in the Donaldson Allotment. The maintenance resulted in an expansion of the earthen berm across the entire floodplain and stream channel to a height of approximately 6-10ft on a series of three ponds. The following is a review of the impacts from continual maintenance of these ponds and their expected effects on MCR steelhead CH within Boulder Creek which are expected to be negative and meaningfully measurable for several MPI indicators and PCEs of MCR steelhead CH.

7.3.3.6 EFFECTS ON CHANGES IN PEAK/ BASE FLOWS

Stock ponds utilized for on-site water within Boulder Creek span the entire floodplain of Boulder Creek effectively capturing the majority of water travelling downstream during peak flows and all base flows. During peak flows in the spring this could delay the timing of when peak flows occur within CH on Boulder Creek by capturing the initial flow generated from snowmelt. If snow pack is low for a given season no instream flow could occur below these ponds. Additionally during base flow periods the stock ponds effectively capture all remaining water and dewater downstream reaches. Peak flows are the channel and fish habitat forming processes that interact with riparian vegetation within the floodplain. Base flows are the channel and fish habitat maintaining processes as well as facilitating vegetation maintenance of hydric species. During extreme flood events water may bypass these ponds but this would be minimal and for a short duration given the extent and height of these ponds.

In addition, maintenance of in-channel stock ponds increases the stream surface area which can result in accelerated loss of water to the atmosphere through evaporation and an overall decrease in base flows.

Conclusion:

The permittee livestock management and infrastructure maintenance PE will likely result in negative and meaningfully measured effects to peak/base flows within the Donaldson allotment. These effects are not evenly distributed across the ESA action area but limited to the stock ponds within MCR steelhead critical habitat on Boulder Creek. The mechanism for which peak/base flows will be altered includes stock of stream flows by ponds that span the entire floodplain.

7.3.3.7 EFFECTS ON CHANGES IN FLOODPLAIN CONNECTIVITY

Continual maintenance of stock ponds within Boulder Creek affects peak and base flows which maintain floodplain connectivity. Shortened duration of wetted channel periods alters riparian vegetation composition and bank stability. Destabilization of the stream banks often results in bank erosion, which may lead to an incised channel that limits access to its floodplain during peak flow events. Primary productivity is decreased downstream from stock ponds and could potentially result in diminished hydric riparian vegetation and low riparian "vigor" as well as encroachment of more mesic plant species such as juniper.

Conclusion:

The permittee livestock management and infrastructure maintenance PE will likely result in negative and meaningfully measured effects to floodplain connectivity within the Donaldson allotment. These effects are not evenly distributed across the ESA action area but limited to the stock ponds within MCR steelhead critical habitat on Boulder Creek.

7.3.3.7.1 EFFECTS ON CHANGES IN WIDTH/ DEPTH RATIO

Altered hydrology from the stock ponds can have indirect effects resulting in overwidened or incised stream channels from loss of bank stabilizing hydric vegetation below ponds due to flows lower than natural conditions and concentration of peak flows within the stream channel. When livestock grazing is added to these effects the result is an overwidened or incised channel due to bank alteration from cattle access along stream banks that have become destabilized because of the loss of hyric riparian vegetation and the highly fluctuating flows resulting from the stock ponds.

Conclusion:

The permittee livestock management and infrastructure maintenance PE will likely result in negative and meaningfully measured effects to width/depth ratios of Boulder Creek within the Donaldson allotment. These effects are not evenly distributed across the ESA action area but limited to the stock ponds within MCR steelhead critical habitat on Boulder Creek.

7.3.3.8 EFFECTS ON CHANGES IN POOL FREQUENCY AND POOL QUALITY

Pool frequency and pool quality are driven by hydrology and channel morphology as well as slope and local geology. Stock ponds for livestock watering effectively alter the hydrology of a stream when placed across the entire stream channel and floodplain. The dissipation of stream energy results in loss of stream bed scouring events that would create or maintain pools, and an increase in the filling of existing pools from lack of flow during peak/base flows.

Conclusion:

The permittee livestock management and infrastructure maintenance PE will likely result in negative and meaningfully measured effects to pool frequency and quality within the Donaldson allotment. These effects are not evenly distributed across the ESA action area but limited to the stock ponds within MCR steelhead critical habitat on Boulder Creek.

7.3.3.9 EFFECTS ON CHANGES IN OFF-CHANNEL HABITAT

Off channel habitat is formed during peak flows and maintained during base flows. Off channel habitat is often formed during flood events when meander channels are abandoned and new channels are formed. They also facilitate dissipation of stream energy during high flows reducing the probability of downcutting and incised channel formation. Off channel habitat provides refugia for MCR steelhead during peak flow events. The stock ponds will alter peak flow events magnitude, duration, and timing.

Conclusion:

The permittee livestock management and infrastructure maintenance PE will likely result in negative and meaningfully measured effects to off channel habitat within the Donaldson allotment. These effects are not evenly distributed across the ESA action area but limited to the stock ponds within MCR steelhead critical habitat on Boulder Creek. The alteration of peak/base flows will result in the filling of off channel habitat and a decrease in the formation of off channel habitat during peak flows.

7.3.3.10 EFFECTS ON CHANGES IN PHYSICAL BARRIERS

Stock ponds within stream channels can effectively act as barriers to adult and juvenile steelhead migration due to their height (8-10ft) and their expanse (across the entire floodplain) within Boulder Creek. Although the stock ponds within Boulder Creek may have not originally been barriers the maintenance that occurred in 2009 resulted in an extension of the earthen berm across the entire floodplain and an extension of the height of the earthen dams from 5-10ft. This effectively created a migration barrier for MCR steelhead within CH. The stock ponds and maintenance that occurred in 2009 pose a serious obstacle to MCR adult steelhead migration and juvenile smolt out migration. Blockage of streams for as little as two years may result in extirpation of a species from a stream (Baxter 1977). Even partial blockage of a stream could obscure the olfactory and tactile information for fish to return to their spawning grounds (Baxter 1977).

Conclusion:

The permittee livestock management and infrastructure maintenance PE will likely result in negative and meaningfully measured effects to migratory corridors within Boulder Creek on the Donaldson allotment. These effects are not evenly distributed across the ESA action area but limited to the stock ponds within MCR steelhead critical habitat on Boulder Creek. The maintenance of these ponds facilitates the extension and longevity of these barriers.

8 ESA EFFECT DETERMINATIONS

ESA effect determinations are presented in Table 2. The determinations are “May Affect, Likely to Adversely Affect” for MCR Steelhead and its designated CH. There are no bull trout or its designated critical habitat in the action area. Consequently, the effect determinations for bull trout are “No Effect.”

8.1 RATIONAL

The PCEs are the physical or biological features of critical habitat essential to the conservation of the species. For PCE 1 (Freshwater spawning sites), the analysis determined that there were **negative and measurable effects** to the *temperature* and *sediment* indicators corresponding to the *water quality* feature of the PCE, and the *substrate embeddedness* indicator corresponding to the *suitable substrate* feature of the PCE, as diagrammed below:

PCE1: Freshwater spawning sites.

- Water Quantity
  - Changes in Peak/Base Flows
  - Water quality PCE feature
    - Temperature indicator
    - Sediment indicator
  - Suitable substrate PCE feature
    - Substrate embeddedness indicator

PCE 2 (Freshwater rearing sites), the analysis determined that there were **negative and measurable effects** to the changes in peak/base flows indicator corresponding to the water quantity feature, *temperature* and *sediment* indicators corresponding to the *water quality* feature of the PCE, the *substrate embeddedness* indicator corresponding to the *forage* feature of the PCE, and the *refugia* and ;*large woody debris* indicator for both the *forage* and *natural cover* features of the PCE, as diagrammed below:

PCE2: Freshwater rearing sites.

- <u>Water Quantity</u>
  - Changes in Peak/Base Flows
- <u>Water quality PCE feature</u>
  - Temperature indicator
  - Sediment indicator
- <u>Floodplain connectivity</u>
  - Floodplain connectivity
  - Width/Depth Ratio
- <u>Forage PCE feature</u>
  - Substrate embeddedness indicator
  - Large woody debris indicator
  - Pool Frequency
  - Pool quality
  - Off-Channel Habitat
  - Refugia indicator
- <u>Natural cover PCE feature</u>
  - Large woody debris indicator
  - Pool Frequency
  - Pool Quality
  - Off-Channel Habitat
  - Refugia indicator

- PCE3 (Freshwater migration corridors)

The analysis determined that there were **negative and measurable effects** to migration corridors from the continual maintenance of stock ponds within the Donaldson allotment (Boulder Creek).

Negative measurable effects do not meet the definition of “insignificant” effects and they are not “discountable” because the effects are likely to occur. Consequently, the effect determination for MCR Steelhead designated CH overall is “May Affect, Likely to Adversely Affect.”

The same NMFS MPI indicators determined to have negative, measurable effects during the PCE analysis were brought forward in the analysis of effects to the species. The mechanisms by which the livestock use (PE 1) and permittee livestock management and infrastructure maintenance (PE 2) would affect habitat characteristics that would in turn result in measurable increases in water temperature, increased sediment and turbidity, increased substrate embeddedness, and decreases in large woody debris, rufugia, pool frequency, pool quality, off channel habitat, and peak/base flows were described in detail. The biological consequences to MCRS Steelhead were also described. The conclusion was that the effects to the indicators would result in negative effects to each indicator that were measurable, and therefore did not meet the definition of “insignificant” effects. They are not “discountable” because the effects are likely to occur.

In addition, there are likely to be direct effects to individual MCR Steelhead from the livestock use PE and permitee livestock management and infrastructure maintenance PE , because livestock will have access to streams during the spawning, incubation, and rearing periods of the MCR Steelhead life cycle, and stock ponds within the Donaldson allotment are physical barriers to both juvenile and adult steelhead as well as potential entrapments. Direct impacts are likely to occur if livestock wade into a stream and disturb rearing juveniles or spawning adults, and/or step on redds. Juveniles in close proximity to stream crossings or watering sites are likely to move out of an area when livestock enter or approach the stream. Juveniles forced into open water are likely to be at increased risk of predation. It is likely that spawning behavior will be interrupted forcing adults to retreat to nearby cover and that redds will be at risk of being stepped on. However, these risks will be minimized with the implementation of the *Malheur National Forest Strategy to Minimize Redd Trampling “Take” of Steelhead and Bull Trout* (Appendix F), which incorporates PDC 5 and 6 (Section 4.1.2). Additionally, MNF staff (range and aquatic specialists) will take extra effort to monitor these sites when they are in the field. If active redds are located, mitigation actions consistent with PDC 6 (Section 4.1.2) will be taken to eliminate or significantly minimize the potential for redd trampling,

In summary, because the proposed action will result in measurable negative effects to components of MCR Steelhead habitat, with indirect effects to the species, and it is likely there will be direct negative effects to adults, juveniles and possibly incubating embryos in redds, the effect determination is “May Affect, Likely to Adversely Affect” the species.

9 ESA CUMULATIVE EFFECTS

ESA cumulative effects are those effects of future State, tribal, local or private activities that are reasonably certain to occur in the area of the Federal action subject to consultation. Future Federal actions that are unrelated to the proposed action are not considered in this section because they are subject to separate consultation pursuant to section 7 of the ESA. There are several future State or private activities that are reasonably certain to occur.

9.1 ODFW ELK AND DEER MANAGEMENT

Big game management on the Malheur National Forest is a cooperative effort between the Forest Service and ODFW where the Forest Service manages habitat while ODFW manages populations. The action area is located entirely within the state of Oregon's Northside Wildlife Management Unit (WMU).

Elk and mule deer utilize streamside vegetation differently. Both animals eat riparian vegetation, but have different forage preferences. The diets of elk, mule deer, and cattle are very different during early summer and become increasingly similar during late summer. Cattle diets have more grasses, deer diets have more shrubs and forbs, and elk diets are in between those of cattle and deer. (USDA 2006). There is overlap between what each species will eat dependent upon season and availability. Additionally, Coe et al. (2005) found a cascading effect of larger ungulates displacing smaller ungulates. They found that the presence of livestock displaced smaller ungulates including mule deer and elk, and that livestock chose resources such as forage before smaller ungulates.

Table 22 presents Rocky Mountain elk and mule deer management objectives (MO) and population estimates from 2004-2010 for the Northside WMU that entirely encompasses the two allotments. The mule deer population MO was obtained from ODFW (2003), available online at: http://www.dfw.state.or.us/wildlife/management_plans/docs/MuleDeerPlanFinal.PDF. Mule deer population estimates, and Rocky Mountain elk MOs and population estimates, were obtained from ODFW wildlife biologist Ryan Torland (pers. comm. 2011).

TABLE 22. ROCKY MOUNTAIN ELK AND MULE DEER MANAGEMENT OBJECTIVES AND WINTER POPULATION ESTIMATES FROM 2004-2010 FOR THE NORTHSIDE WILDLIFE MANAGEMENT UNIT IN OREGON.

	Northside Wildlife Management Unit	
Year	Elk Mgmt. Objective = 2,000	Deer Mgmt. Objective = 15,500
2004	2,000	7,950
2005	2,000	7,954
2006	2,000	8,137
2007	2,400	7,358
2008	2,500	7,325
2009	2,500	7,085
2010	2,500	7,228

ODFW has managed the elk population of the Northside WMU at or above the population MO. Beginning in 2007, the elk population has exceeded the MO for four consecutive years. The mule deer population MO was not exceeded during 2004-2010 in the WMU.

There is a potential for cumulative effects to MCR Steelhead designated CH from use by wild ungulates. Such effects are identical to those described in the effects to MCR Steelhead CH section: (1) increased sediment in stream channels resulting in increased turbidity, substrate embeddedness, a reduction in macroinvertebrate production, and reduced quality of spawning gravel; (2) and an increase in water temperature as a result of shade loss along stream channels from grazing/browsing of riparian vegetation.

9.2 UNAUTHORIZED LIVESTOCK GRAZING

Unauthorized livestock grazing has occurred in the allotments, and is reasonably certain to occur in the future. The unauthorized use has been resolved in a timely manner once MNF staff notified livestock owners. As long as the MNF takes timely action whenever trespass occurs, habitat degradation is likely to be minimized.

9.3 ACTIONS ON PRIVATE PROPERTY

The ESA action area includes private property in-holdings. There is the potential for properties to be developed. However, we do not have any information on specific proposals at this time. The effects to PCEs of CH of activities on private property, such as cattle grazing, are expected to continue at the same rate as they have been.

10 ESSENTIAL FISH HABITAT FOR CHINOOK SALMON

The Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. The MSA requires Federal agencies to consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH.

The Pacific Fisheries Management Council (PFMC) is one of eight regional fishery management councils established under the Magnuson-Stevens Act. PFMC develops and carries out fisheries management plans for salmon, groundfish and coastal pelagic species off the coasts of Washington, Oregon, and California, and recommends Pacific halibut harvest regulations to the International Pacific Halibut Commission.

As required by the Magnuson-Stevens Act, the PFMC described and identified Essential Fish Habitat (EFH) in each of its fisheries management plans. The EFH includes "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity." All streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California are designated as EFH for affected salmon stocks with management plans. The Upper John Day 4th field HUC (HUC 17070201) and Middle Fork John Day 4th field HUC (HUC 17070203), which encompass the project area, have been designated as EFH for Chinook salmon (73 FR 200:60987 October 15, 2008). However, finer resolution of what constitutes waters "currently or historically accessible to salmon" is dependent upon local information.

The Magnuson-Stevens Act (MSA) also established an EFH consultation process. Federal agencies are required to consult with NMFS on all actions that may adversely affect EFH. The NMFS interprets the scope of these consultations to include actions by Federal agencies that occur outside designated EFH, such as upstream or upslope, but which nonetheless may have an adverse effect on habitat conditions necessary for the long-term survival of the species within EFH. NMFS must provide conservation recommendations for any Federal or State activity that may adversely affect EFH. Within 30 days of receiving EFH conservation recommendations from NMFS, Federal agencies must conclude EFH consultation by responding to NMFS with a written description of conservation measures the agency will use to avoid, mitigate or offset the impact of its action on EFH. If the Federal agency selects conservation measures, which are inconsistent with the conservation recommendations of NMFS, the Federal agency must explain in writing its reasons for not following NMFS recommendations.

The MNF searched for information to determine if the action under EFH consultation includes areas currently or historically accessible to Spring Chinook salmon. Regarding current use, an ODFW website provides access to Spring Chinook salmon distribution quad maps within the state of Oregon. The ODFW maps are accessible at:
http://nrimp.dfw.state.or.us/nrimp/default.aspx?pn=chs_dist.

The MNF could not find any references that Chinook salmon historically utilized any streams within the allotments. No quad maps were found that contain the allotments analyzed. The analysis of effects to designated CH for MCR Steelhead concluded that there were measurable negative effects to several PCEs. These effects are a proxy for effects to Chinook salmon EFH as they have similar habitat requirements. However, there is no information to support that Chinook salmon historically or currently use any stream in the three allotments. Furthermore, the nearest Chinook salmon habitat is greater than 10 miles from the boundary of the three allotments. There is no likelihood that the effects to designated CH for MCR steelhead (as a proxy for effects to EFH for Spring Chinook salmon) will be detectable at those distances in Deer Creek or the NFJD River, where historic and current use by Chinook salmon is documented. Consequently, the MNF concludes that the proposed action will not adversely affect EFH for MSA-managed Chinook salmon (Table 2).

11 REFERENCES

Al-Chokhachy, R., B. B. Roper, and E. Archer. 2010. Using a multimetric approach to evaluate the abiotic condition of streams in the upper Columbia and Missouri river basins. Transactions of the American Fisheries Society 139:1041–1059.

Alvarado, R. 2011. Personal communication. Wildlife Program Manager, Pacific Northwest Region, Regional Office, USDA Forest Service, Portland, OR. June 7, 2011.

Armour, C.L., D.A. Duff and W. Elmore. 1991. The effects of livestock grazing on riparian and stream ecosystems. Fisheries 16(1): 7–11.

Baxter, R. M. 1977. Environmental Effects of Dams and Impoundments. (8):255-283 Annual Review of Ecology and Systematics

Benda, L. E., D. Miller, T. Dunne, J. Agee, and G. H. Reeves. 1998. Dynamic landscape systems. Pages 261-288 *in* R. J. Naiman and R. E. Bilby eds. River ecology and management: lessons from the Pacific Coastal Region. Springer Verlag, New York.

Bengeyfield, P. 2006. Managing cows with streams in mind. Rangelands 28(1): 3–6.

Benngeyfield, P. and D. Svoboda.1989. Determining allowable use levels for livestock movement in riparian areas. Specialty Conference on Rangeland Management and Water Resources. Proceedings. American Water Resources Association. Reno, NV.

Berg, L. and T.G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. Canadian Journal of Fisheries and Aquatic Sciences 42:1410-1417.

Beschta, R.L. 1997. Riparian shade and stream temperature: an alternative perspective. Rangelands. 19(2): 25-28.

Beschta, R.L. and J. Weatherred. 1984. A computer model for predicting stream temperatures resulting from the management of streamside vegetation. USDA Forest Service. WSDG-AD-00009.

Beschta, R.L, and W. J. Ripple. 2005. Rapid assessment of riparian cottonwoods: Middle Fork

John Day River, northeastern Oregon. Ecological Restoration 23: 150-156.

Beschta, R.L, R.E. Bilby, G.W. Brown, L.B. Holtby, and T.D. Hofstra. 1987. Stream temperature and aquatic habitat: Fisheries and forestry interaction. Pp. 191-232. University of Washington, Institute of Forest Resources, Contribution No. 57.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138, *In* W.R. Meehan (editor) Influences of forest and rangeland management on salmonid fishes and their habitats. Special Publication 19. American Fisheries Society.

Boyd, M.S. 1996. Heat Source: stream temperature prediction. Master's Thesis. Department of Civil and Bioresource Engineering, Oregon State University, Corvallis, Oregon.

Braatne, J.H., S.B. Rood and P.E. Heilman. 1996. Life history, ecology, and conservation of riparian cottonwoods in North America. Pages 57-85 *in* R.F. Stettler, H.D. Bradshaw, Jr. and T.M Hinkley (eds.), Biology of *Populus* and its Implications for Management and Conservation. Ottawa, Ontario, Canada: National Research Council.

Brown, G.W. 1969. Predicting temperatures of small streams. Water Resour. Res. 5(1):68-75.

Brown, G.W. 1972. An improved temperature model for small streams. Water Resour. Report 16, Oregon State University, Corvallis, Oregon.

Bunte, K. and S.R. Abt. 2001. Sampling surface and sub-surface particle sizedistributions in wadeable gravel- and cobble-bed streams for analysis in sediment transport, hydraulics, and streambed Monitoring. USDA Forest Service, Rocky Mountain Experiment Station, General Technical Report,RMRS-GTR-74. 450 pp.

Bureau of Land Management. 1996. Utilization Studies and Residual Measurements. Interagency Technical Reference. BLM/RS/ST-96/004+1730.

Bureau of Land Management, Prineville District (PD BLM). 2006. Biological assessment: LAA grazing actions on the lower John Day River for 2006 and beyond. Prineville BLM District Office, Prineville, Oregon.

Burton, T.A., E.R. Cowley, and S.J. Smith. 2008. Monitoring Stream Channels and Riparian Vegetation—Multiple Indicators Version 5.0 – 2008 BLM/ID/GI-08/001+1150

Burton, T.A., S.J. Smith, and E.R. Cowley. 2011. Riparian area management: Multiple

indicator monitoring (MIM) of stream channels and streamside vegetation. Technical Reference 1737-23. BLM/OC/ST-10/003+1737. U.S. Department of the Interior, Bureau of Land Management, National Operations Center, Denver, CO. 155 pp.

Case and Kauffman. 1997. Wild ungulate influences on the recovery of willows, black cottonwood and thin-leaf alder following cessation of cattle grazing in northeastern Oregon. Northwest Science. 1997; 71(2): 115-126.

Claire, E. W. and R. L. Storch. 1977. Streamside management and livestock grazing: an objective look at the situation. In: *Proc. Symp. Livestock and Wildlife-Fisheries Relationships in the Great Basin*. Sparks, Nevada. May 3-5, 1977.

Clary, W. P. 1999. Stream channel and vegetation responses to late spring cattle grazing. Journal of Range Management. 52: 218-227.

Clary, W. P. and B. F. Webster. 1989. Managing grazing of riparian areas in the Intermountain Region. General Technical Report INT-263, U.S. Dept. of Agriculture, USFS, Intermountain Research Station, Ogden, Utah. 11 p.

Clary, W. P., C. I. Thornton and S. R. Abt. 1996. Riparian stubble height and recovery of degraded streambanks. Rangelands. 18: 137-140.

Clary, W.P., and W.C. Leininger. 2000. Stubble height as a tool for management of riparian areas. J. Range Management 53(6): 562-573.

Coe, P. K., B. K. Johnson, K. M. Stewart, and J. G. Kie. 2005. Spatial and Temporal Interactions of Elk, Mule Deer, and Cattle. In: Transactions of the 69th North American Wildlife and Natural Resources Conference: 656-669.

Coulloudon, B., K. Eshelman, J. Gianola, N. Habich, L. Hughes, C. Johnson, M. Pellant, P. Podborny. A. Rasmussen, B. Robles, P. Shaver, J. Spehar, J. Willoughby. 1999. Sampling Vegetation Attributes. BLM Technical Reference 1734-4, Denver, CO.

Cowley, E.R. 2002. Guidelines for Establishing Allowable Levels of Streambank Alteration. USDI, Bureau of Land Management, Idaho State Office. Information Bulletin No. ID-2002-172. Boise, Idaho.

Cowley, E.R. and T.A. Burton. 2005. Monitoring Streambanks and Riparian Vegetation – Multiple Indicators. Tech. Bull. No. 2005-002. USDI, BLM, Idaho State Office. Boise, ID. http://www.id.blm.gov/techbuls/05_02/doc.pdf

Gregory, J. S., and B. L. Gamett. 2009. Cattle trampling of simulated bull trout redds. North American Journal of Fisheries Management 29:361–366.

Gregory, S.G., K. L. Boyer, and A.M. Gurnell, editors. 2003. The ecology and management of wood in world rivers. American Fisheries Society Publication. 444 pp.

Gurnell, A., H. Piegay, F. J. Swanson, and S. V. Gregory. 2002. Large wood and fluvial processes. Freshwater Biology 47:601-619

Hall, F.C and L. Bryant L. 1995. Herbaceous Stubble Height as a Warning of Impending Cattle

Grazing Damage to Riparian Areas. USDA Forest Service Gen Tech Rep PNW-362. 10 p.

Heitke, J. D., R. C. Henderson, B. B. Roper, and E. K. Archer. 2008. Evaluating livestock grazing use with streambank alteration protocols; challenges and solutions. Rangeland Management and Ecology 61:647–655.

Henderson, R. C., E. K. Archer, B. A. Bouwes, M. S. Coles-Ritchie, and J. L. Kershner. 2005. PACFISH/INFISH Biological Opinion (PIBO): Effectiveness Monitoring Program seven-year status report 1998 through 2004. General Technical Report RMRS-GTR-162. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station Fort Collins, Colorado.

Interior Columbia Basin Technical Recovery Team. 2003. Independent Populations of Chinook, Steelhead, and Sockeye for Listed Evolutionarily Significant Units Within the Interior Columbia River Domain. Working Draft, July 2003. Northwest Fisheries Science Center, NMFS Northwest Region.

Kauffman, J. B. and W. C. Krueger. 1984. Livestock impacts on riparian ecosystems and streamside management implications - a review. Journal of Range Management 37(5):430-438.

Kauffman, J. B., W. C. Krueger, and M. Vavra. 1983. Effects of late season grazing on riparian communities. Journal of Range Management 36(6):685-691.

Kershner, J.L., B.B. Roper, N. Bouwes, R. Henderson, and E. Archer. 2004. An Analysis of Stream Habitat Conditions in Reference and Managed Watersheds on Some Federal Lands within the Columbia River Basin. North American Journal of Fisheries Management 24: 1363-1375.

Kershner, J. and B. Roper. 2010. An evaluation of management objectives used to assess stream habitat conditions on Federal lands within the Interior Columbia Basin. Fisheries 35(6):269-278.

Lee, R. 1980. Forest hydrology. Columbia University Press, New York.

Li, H.W. G.A. Lamberti, T.N. Pearsons, C.K. Tait, and J.L. Li. 1994. Cumulative effects of riparian disturbances along high desert trout streams of the John Day Basin, Oregon. Transactions of the American Fisheries Society. 123:629-640.

Lisle, T.E. 1987. Using “Residual Depths” to monitor pool depths independently of discharge. Research Note PSW-394. U.S. Department of Agriculture, Pacific Southwest Forest and Range Experiment Station. 4 pp.

Malheur National Forest (MNF). 1990. Malheur National Forest Land and Resource Management Plan.

Malheur National Forest (MNF). 1992. Fields Creek level II stream survey report.

Malheur National Forest (MNF). 1993 Vance and South Fork Vance Creek level II stream survey report.

Malheur National Forest (MNF). 1995a. Hanscombe Creek level II stream survey report.

Malheur National Forest (MNF). 1995b. Riley Creek level II stream survey report.

Malheur National Forest (MNF). 1995c. Ingle Creek level II stream survey report.

Malheur National Forest (MNF). 1995d. Laycock Creek level II stream survey report.

Malheur National Forest (MNF). 2004. Malheur National Forest Roads Analysis Report.

Malheur National Forest (MNF). 2006. Malheur National Forest Range Monitoring Guidelines. October 16, 2011.

Malheur National Forest (MNF). 2007. Biological assessment for grazing activities on the Rail Creek Allotment. Prairie City Ranger District. September 28, 2007. 23 p.

Malheur National Forest (MNF). 2009a. 2009 end of year grazing report: Blue Mountain Ranger District, Malheur National Forest. December 16, 2009.

Malheur National Forest (MNF). 2009b. 2008 end of year grazing report for the Blue Mountain Ranger District of the Malheur National Forest. January 7, 2009.

Malheur National Forest (MNF). 2011. 2010 end of year grazing report: Blue Mountain Ranger District, Malheur National Forest. January 6, 2011.

McDowell, P.F. and A. Mowry. 2002. Geomorphic Response to Exclosures *in* Kaufman, J, P. McDowell, P. Bayley, H. Li, R. Beschta, "Research /Evaluate Restoration of NE Oregon Streams", Project No. 2000-05100, 93 electronic pages, (BPA Report DOE/BP-00006210-1)

National Marine Fisheries Service (NMFS). 1996. Making ESA Determinations of Effect for Individual or Grouped Actions at the Watershed Scale. NOAA Fisheries, Environmental and Technical Services Division, Habitat Conservation Branch, 525 NE Oregon Street, Portland, Oregon. 28 p. (Available @ www.nwr.noaa.gov under Habitat Conservation Division, Habitat Guidance Documents). http://www.nwr.noaa.gov/Publications/Guidance-Documents/upload/matrix_1996.pdfU3T

National Marine Fisheries Service (NMFS). 2000. Biological Opinion for the effects to anadromous salmonids from continued implementation of land and resource management plans and resource management plans as amended by the interim strategy for managing fish producing watersheds in eastern Oregon and Washington, Idaho, western Montana, and portions of Nevada (INFISH), and the interim strategy for managing anadromous fish-producing watersheds in eastern Oregon and Washington, Idaho, and portions of California (PACFISH).

National Marine Fisheries Service (NMFS). 2004. Consultation on Remand for Operation of the Columbia River Power System and 19 Bureau of Reclamation Projects in the Columbia Basin. NOAA Fisheries Log Number: F/NWR/2004/00727. November 30.

National Marine Fisheries Service (NMFS). 2005. Final Assessment of NOAA Fisheries Critical Habitat Analytical Review Teams for 12 Evolutionarily Significant Units of West Coast Salmon and Steelhead (August 2005), including Appendix J: Initial CHART Assessment for the Middle Columbia River Steelhead.

National Marine Fisheries Service (NMFS). 2007a. Letter of concurrence for the Blue Mountain expedited Section 7 consultation process to the Forest Supervisor of the Malheur National Forest. NMFS no. 2007/02970.

National Marine Fisheries Service (NMFS). 2007b. Endangered Species Act - Section 7 Consultation Biological Opinion and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation: Malheur National Forest 2007-2011 Administration of Thirteen Grazing Allotments, North Fork John Day Subbasin (HUC 17070202), Middle Fork John Day Subbasin (HUC 17070203), Upper John Day Subbasin (HUC 17070201), Grant County, Oregon. NMFS No. 2007/01290.

National Marine Fisheries Service (NMFS). 2008. Endangered Species Act Section 7 Formal Programmatic Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for Fish Habitat Restoration Activities in Oregon and Washington. NMFS No. FS: 2008/03505**.** NMFS No. BLM: 2008/03506.

National Marine Fisheries Service (NMFS). 2009. Middle Columbia River Steelhead ESARecovery Plan. Available at: http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Interior-Columbia/Mid-Columbia/upload/Mid-C-Prop-Plan.pdf

Northwest Power and Conservation Council (NPCC). 2005. John Day Subbasin Plan. Prepared by Columbia-Blue Mountain Resource Conservation and Development Area for The NPCC. http://www.nwcouncil.org/fw/subbasinplanning/johnday/plan/PlanRevised.pdf

ONDA v. Tidwell, Civ. No. 07-1871-HA, Docket #235.

Oregon Department of Environmental Quality (ODEQ). 2010. John Day River Basin Total Maximum Daily Load (TMDL) and Water Quality Management Plan (WQMP). November 2010.

Oregon Department of Fish and Wildlife (ODFW). 2003. Oregon’s Mule Deer Management Plan. February 2003. 29 p.

Oregon Department of Fish and Wildlife (ODFW). 2010. Conservation and Recovery Plan for Oregon Steelhead Populations in the Middle Columbia River Steelhead Distinct Population Segment.

Park, C.S. 1993. SHADOW stream temperature management program. USDA, USFS, Pacific Northwest Region.

Platts, W. S. 1981. Influence of forest and rangeland management on anadromous fish habitat in western North America -effects of livestock grazing. USDA Forest Service Gen. tech. Report PNW-124. 25 p.

Platts, W. S. 1991. Livestock grazing. pp. 389-424 in Meehan, ed., Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Soc., Bethesda, Maryland. 751 p.

Platts, W.S., C. Armour, G.D. Booth, M. Bryant, J.L. Bufford, P. Cuplin, S. Jensen, G.W. Lienkaemper, G.W. Minshall, S.B. Monsen, R.L. Nelson, J.R. Sedell, and J.S. Tuhy. 1987. Methods for evaluating riparian habitats with application to management. General Technical Report INT-221. Intermountain Research Station, U.S. Department of Agriculture Forest Service. Ogden, UT.

Powell, Russ, Kenneth Delano, "John Day River Subbasin Fish Habitat Enhancement Project", 2002-2003 Annual Report, Project No. 198402100, 31 electronic pages, (BPA Report OE/BP-00005632-3)

Prichard, D., C. Bridges, R. Krapf, S. Leonard, and W. Hagenbuck. 1994. Riparian Area Management: Process for Assessing Proper Functioning Condition for Lentic Riparian-Wetland Areas. TR 1737-11. Bureau of Land Management, BLM/SC/ST-94/008+1737, Service Center, CO. 37 pp.

Prichard, D., J. Anderson, C. Correll, J. Fogg, K. Gebhardt, R. Krapf, S. Leopnard, B. Mitchell, and J. Staats. 1998. Riparian Area Management TR 1737-15. A User Guide to Assessing Proper Functioning Condition Under the Supporting Sciences for Lotic Areas. National Business Center, BC-650B, P.O. Box 25047, Denver, Colorado.

Reiser, D. W. and R. G. White. 1988. Effects of two sediment-size classes on survival of steelhead and Chinook salmon eggs. North American Journal of Fisheries Management 8:432-437.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.

Sheer, Mindi B. et. al.   2008. Development and Management of Fish Intrinsic Potential Data and Methods: State of the IP 2008 Summary Report.

Spence, B.C. and G.A. Lomnicky, R.M. Huges, R.P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. Management Technology. 356 pp. http://www.nwr.noaa.gov/1habcon/habweb/habguide/ManTech/front.htmU3T

Stewart, K. M., R. T. Bower, J. G. Kie, B. L. Dick, M. Ben-David. 2003. Niche partitioning among mule deer , elk, and cattle: do stable isotopes reflect dietary niche? Ecoscience 10(3): 297-302.

Suttle, K. B., M. E. Power, J. M. Levine, and C. McNeely. 2004. How fine sediment in riverbeds impairs growth and survival of juvenile salmonids. Ecological Applications 14:969–974.

Tappel, P. D. and T. C. Bjornn. 1983. A new method of relating size of spawning gravel to salmonid embryo survival. North American Journal of Fisheries Management 3:123-135.

Torland, Ryan. 2011. Personal communication. Oregon Department of Fish and Wildlife, John Day Oregon.

University of Idaho Stubble Height Study Team. 2004. University of Idaho Stubble Height Study Report. Submitted to Idaho State Director, BLM, and Regional Forester, Region 4, US Forest Service. University of Idaho Forest, Wildlife and Range Experiment Station, Moscow, ID. 26p.

USDA Forest Service, Regions 1, 4 and 6. 1991. Columbia River Basin Anadromous Fish Habitat Management Policy and Implementation Guide. 30 p.

USDA Forest Service 1995. Inland Native Fish Strategy: Interim strategies for managing fish-producing watersheds in Eastern Oregon and Washington, Idaho, Western Montana and portions of Nevada (INFS).

USDA Forest Service. 2001. Forest Roads - A Synthesis of Scientific Information. General Technical Report GTR-509. May 2001.

USDA Forest Service and USDA Bureau of Land Management. 1994. Environmental assessment for the implementation of interim strategies for managing anadromous fish-producing watersheds in Eastern Oregon and Washington, Idaho, and portions of California (PACFISH).

U.S. Environmental Protection Agency (EPA). 1993. Monitoring protocols to evaluate water quality effects of grazing management on western rangeland streams. Region 10, Seattle, WA. 179 p.

Waters, T. 1995. Sediment in streams: sources, biological effects and control. American Fisheries Society Monograph 7.

Winward, A. H. 2000. Monitoring the vegetation resources in riparian areas. Gen. Tech. Rep. RMRS-GTR-47. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Wissmar, R., J. Smith, B. McIntosh, H. Li, G. Reeves, and J. Sedell. 1994. A history of resource use and disturbance in riverine basins of eastern Oregon and Washington (early 1800s-1990s). Northwest Science 68:1-35.

Wright, K. and J. Li. 2002. From continua to patches: examining stream community structure over large environmental gradients. Canadian Journal of Fisheries and Aquatic Sciences 59: 1404-1417.